

A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

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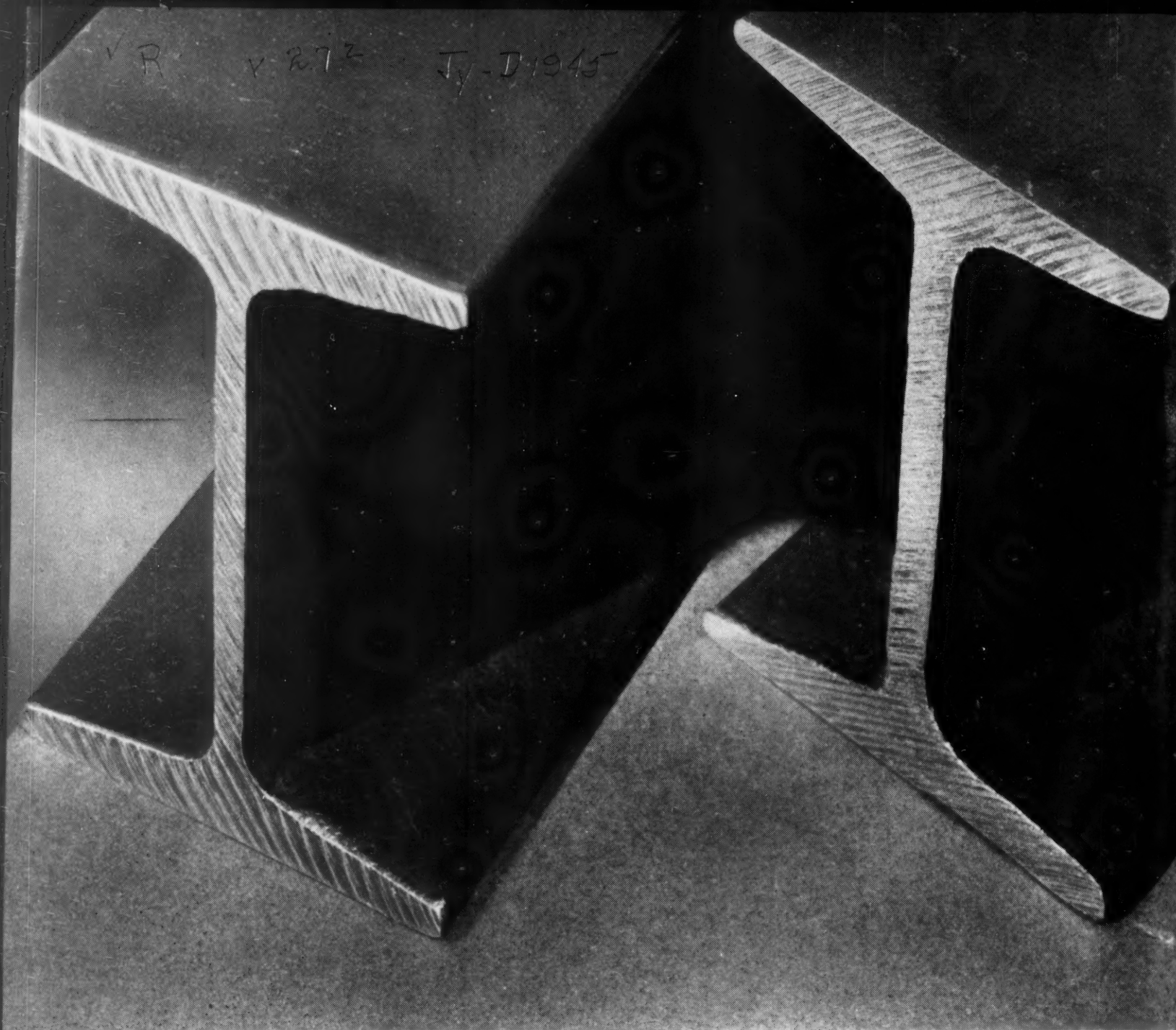
JULY
1945

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CURRENT JOBS

... and Who's Doing Them

BUILDINGS

Public—Carbon plant at Odessa, Tex., will be built by **Ford, Bacon & Davis**, of New York, N. Y., for \$5,000,000. Contract for \$3,000,000 plant at Beloit, Wis., was awarded to **Cunningham Bros.**, of Beloit. Low bid of \$2,512,500 for housing was submitted by **Sherry-Richards Co.**, of Chicago, Ill. Navy contract for magazines at Bangor, Wash., went to **Sound-Kiewit Construction Co.**, of Seattle, for \$2,733,556. Contract for veterans' buildings at Fargo, N. D., was awarded to **Hagstrom Construction Co.**, of St. Paul, Minn., for \$1,719,300. Carbon plant at Seagraves, Tex., will be built by **Fluor Co.**, of Kansas City, Mo., for \$1,500,000. **Pacific Construction Co.**, of Honolulu, T. H., has \$1,755,281 contract for dwellings at Oahu. **James W. Glover** of Honolulu, will build dwellings at Oahu for \$1,492,392. Navy contract for magazines at Crane, Ind., went to **Johnson, Drake & Piper, Inc.**, of New York, N. Y., for \$1,355,000. Another Navy contract for magazines at Crane, Ind., went to **Maxon Construction Co.**, of Dayton, Ohio, for \$1,300,500. **Rubin Construction Corp.**, of New York, N. Y., submitted low bid of \$1,158,690 for dwelling units at Newark, N. J. **Johnson, Drake & Piper**, of Oakland, Calif., has \$1,077,121 contract for housing at Hawthorne, Nev.

Industrial—Plant at Chicago, Ill., will be built by **Herlihy Mid-Continent Co.**, of Chicago, for \$11,000,000. **M. W. Kellogg Co.**, of Los Angeles, Calif., has \$3,049,000 contract for plant at Torrance. **John F. Bloomer Co.** and **Joseph D. Bonness, Inc.**, of Milwaukee, Wis., have \$925,199 Army contract for apron pavement at Maxwell Field, Ala.

Commercial—Contract for mine development at Lansford, Pa., went to **Carey Baxter & Kennedy**, of New York, N. Y., for \$3,000,000. **Psaty & Fuhrman, Inc.**, of New York, N. Y., has \$2,250,000 contract for apartments at Akron, Ohio.

HEAVY CONSTRUCTION

Army contract for airfield improvements at Fairfield, Calif., went to **Morrison-Knudsen Co.**, of San Francisco, and **Stolte, Inc.**, of Oakland, for an estimated \$19,000,000. Transit sheds at Stockton, Calif., will be built for Navy by **Kiewit, Johnson & Everest**, of San Francisco, for \$4,700,000. Army contract for runways at Maxwell Field, Ala., went to **Wright Contracting Co.**, of Columbus, Ga., for \$1,666,347. Navy contract for aviation buildings at Philadelphia, Pa., went to **John McShain, Inc.**, of Philadelphia, for \$1,639,200. Pier improvements at Hunters Point, Calif., will be built for Navy by **Gerwick, Morrison, Knudsen & Twaits**, of San Francisco, for \$1,146,254. **Mowat-Sellen Co.**, of Seattle, Wash., has \$1,147,492 Army contract for hangar at Seattle. Low bid of \$1,000,000 was submitted by **Smith Engine Co.** and **Noonan Construction Co.**, of Pensacola, Fla., for runways at Eglin Field. **Kiewit, Johnson & Everest**, of San Francisco, has \$936,031 Navy contract for taxiways at Moffett Field. Air station heating plant at Cherry Point, N. C., will be built for Navy for \$927,700 by **Raisler Corp.**, of New York, N. Y.

HIGHWAYS

Among recent highway contract awards are the following: Alabama, \$290,966 to **Carlton Contracting Co.**, of Albany, Ga.; and \$222,419 to **C. C. Moore Construction Co.**, of Panama City, Fla. Illinois: \$329,858 to **Graham Paving & Construction Co.**, of Chicago. Kentucky: \$238,878 to **J. C. Codell & Co.**, of Winchester. North Carolina: \$204,649 to **F. D. Cline**, of Raleigh. Oregon: \$601,501 to **McNutt Bros.**, of Eugene. Pennsylvania: \$322,453 to **Fago Construction Co.**, of Buffalo, N. Y.; and \$319,533 to **McCready Construction Co.**, of Pittsburgh.

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

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Patricia McGerr; Paul Wootton and A. N. Carter (Washington)

N. A. Bowers (San Francisco)

JULY, 1945

THE *How* OF IT

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

- How **GUN CARRIAGES** were used to replace demolished arches of French bridge —p. 65
- How **GLASS CLOTH** was used by Army Engineers for airplane hangar curtains, side walls and ends —p. 66
- How **PIPELINES UNDER ENGLISH CHANNEL** were laid to carry million gallons of fuel daily to France —p. 68
- How **FLEXIBLE PIPE** was coiled around vertical drum of Liberty ship —p. 68
- How **TRACTOR DRAGLINE** was used to build timber access road in wet weather —p. 71
- How **POWDERED ADMIXTURE** waterproofed shale road in Pennsylvania stabilization test —p. 72
- How **MODERN TRENCHING MACHINES** cut ditches at rate of mile a day —p. 74
- How **USE OF TWO TRENCHERS** in tandem assured steady mileage of pipeline construction —p. 74
- How **BANK-SLOPING DEVICE** built of two grader blades on boom of wheel-type ditcher was used for open-ditch farm drainage —p. 76
- How **HAZARDOUS MARINE SALVAGE** removed wreckage of blasted ammunition ships —p. 80
- How **HALF-SIZE CEMENT SACKS** are used for military construction near front lines —p. 81
- How **RIGID SEWER** of concrete-encased pipe was installed in trench of water-quicksand —p. 83
- How **ROCK** was removed from railroad cuts with safety —p. 84
- How **"FLOATING ROAD"** was replaced by hydraulic fill causeway —p. 88
- How **OVERSIZE PLYWOOD** simplified construction work —p. 92
- How **ARC WELDING** speeded boiler stack erection —p. 95
- How **MARINE RAILWAY** was used in ship repair work —p. 96
- How **SINGLE-PASS STABILIZING MACHINE** improved processing of soil roads —p. 100
- How **PANAMA SEAWALL** was completed quickly by building outward from shores at both ends —p. 102

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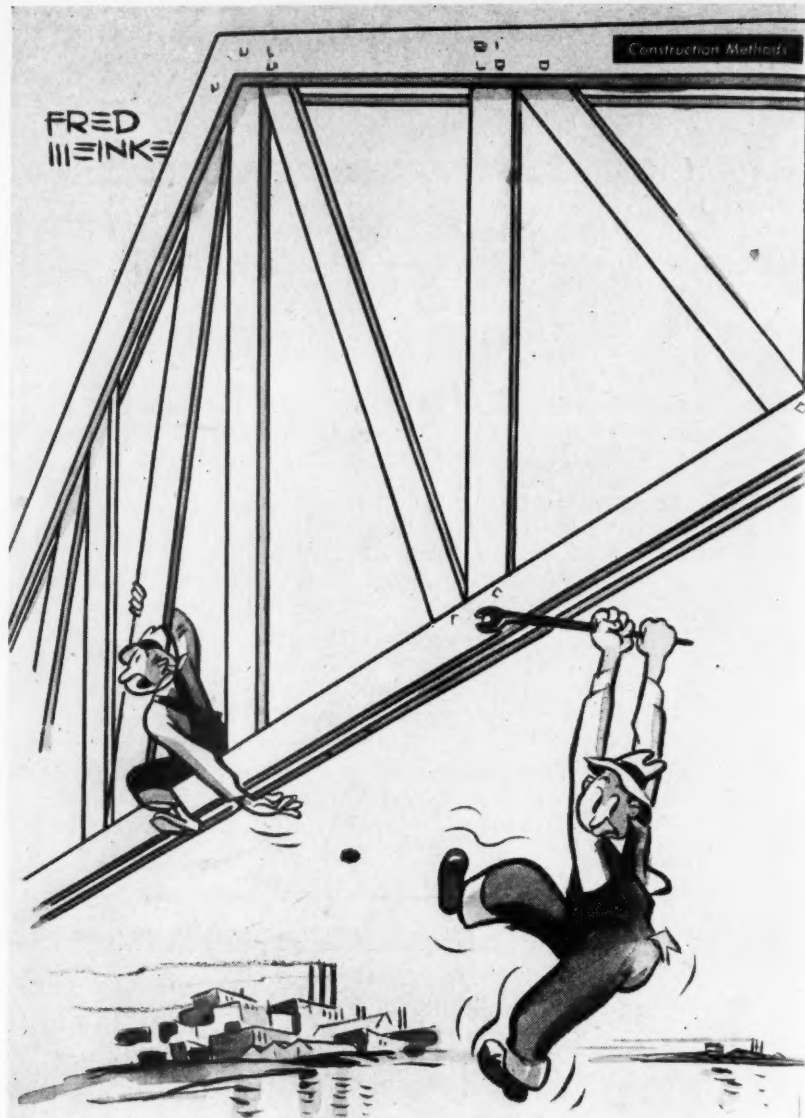
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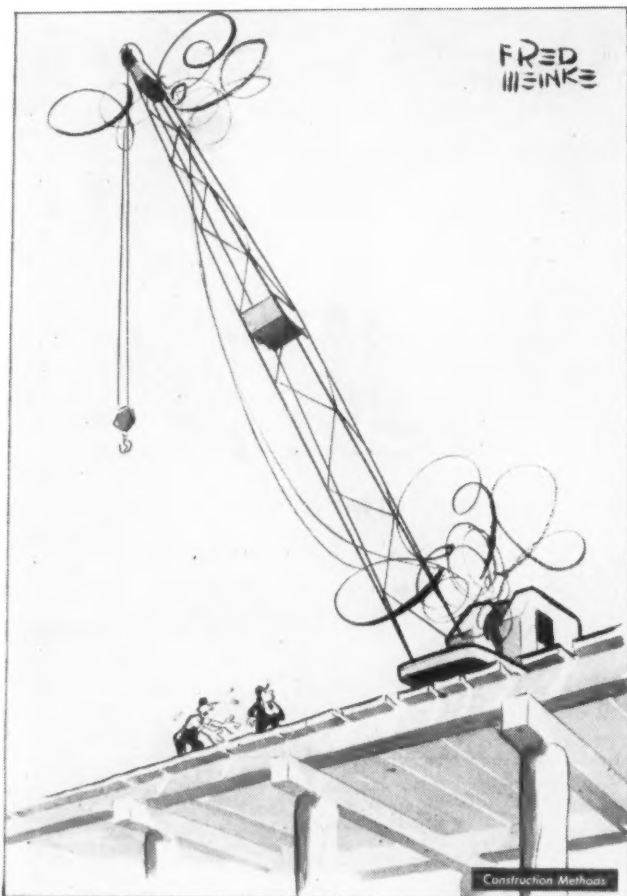
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THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS



"C'mon! C'mon! Toss me your wrench."



"I don't know why it is but the same thing happens to me when I go fishing."



"They always come here to practice."

GET **Extra Wear** IN CONCRETE FLOORS



FOR heavy-duty concrete floors, use 'Incor' 24-Hour Cement and sound aggregates in a **DRY MIX**, to avoid segregation. Compact and finish carefully, **THEN CURE THOROUGHLY**—too little curing defeats all the good work that goes before. For curing insurance, always use 'Incor'. Kept wet **ONLY ONE DAY**, 'Incor' concrete is as strong, dense and wear-resistant as ordinary concrete cured 6 to 8 days. **NEXT-TO-AUTOMATIC CURING** with 'Incor' assures—

GREATER DURABILITY—EXTRA WEAR
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—place concrete today, use it tomorrow

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LONE STAR PORTLAND CEMENT
for concrete of outstanding quality in all types of construction

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—saves time, cuts costs

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When contractors need financial help in securing construction equipment, they can obtain it, quickly, through the new C.I.T. Construction Equipment Funding Plan.

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When you buy new or used construction machinery, finance the purchase through C.I.T.—repay over months or years—let the equipment help pay for itself out of earning capacity. Conserve working funds for other uses. This newly developed financing plan is specially designed to meet the needs of contractors in securing all the equipment necessary to handle the work awaiting the construction industry. Write, wire or phone our nearest office for full details. No obligation.

HERE'S WHAT YOU DO: Select the equipment you want; tell us the total amount, type of machine, name of seller and how you wish to pay for the purchase. We will need current financial information about your business. Our credit decision will be based on a fair and friendly review of past and present records and future prospects. When the transaction is approved, and equipment is ready for delivery, C.I.T. funds will complete the purchase. You can amortize the cost on terms to suit your requirements.

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● Built for tough off-the-highway hauling jobs, Rear-Dump and Bottom-Dump EUCLIDS have boosted production and reduced hauling costs on hundreds of construction and mining projects. Here are some of the features that result in the outstanding performance of Euclids in any material and on any length of haul:

Rugged simplicity — Designed for dependable performance as well as appearance, there are fewer wearing parts; maintenance costs and down-time for repairs are reduced to a minimum.

Capacity — Euclid models have payload capacities ranging from 15 to 32 tons; favorable ratio of unit weight to payload capacity means more pay tons hauled on every trip.

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Versatility — Efficient for hauling any material on any length haul; handle heavy overburden, earth, rock, coal, ore and other materials loaded by shovels, draglines, transfer bins, mobile loaders and other modern digging and loading equipment.

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**SELF-POWERED
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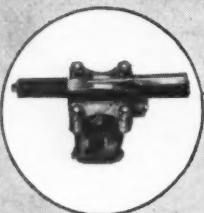
CLEAR THE WAY FOR NEW CONSTRUCTION

WITH

Thor

PAVING BREAKERS

THOR FEATURES THAT
SPEED UP HEAVY
DEMOLITION . . .



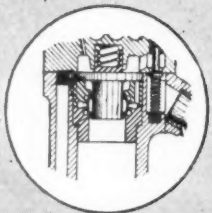
4-BOLT BACK HEAD

Gives maximum strength and rigidity when prying or when leverage action is applied to the breaker.



LATCH-TYPE RETAINER

Simple, efficient. A spring detent holds latch retainer in closed position. Operator has only to press down on retainer with his foot to insert or release tool.



POSITIVE, SHORT-TRAVEL TUBULAR VALVE

This actuates a block-type piston, minimizes vibration and makes machine easier to handle. Also assures reliable performance with low air consumption.



No. 25 Heavy Duty
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BUILT FOR HEAVY DUTY . . . DESIGNED FOR FAST, EASY HANDLING

Thor Breakers pack the power to make fast work of toughest demolition jobs—pavements, walls, columns, piers, foundations, etc. Operators enjoy the smooth, easy handling of Thor Breakers that is due to improved balance and freedom from unnecessary vibration. Together, these features assure more work in less time with less effort—at a definite saving in job costs.

Strength, rigidity and longer life are guaranteed by alloy-steel drop-forged construction . . . Thor Breakers have the extra stamina and capacity to handle the toughest jobs day after day at minimum operating and maintenance costs. "Measured air"—an exclusive Thor feature—provides maximum power for peak efficiency.

For complete information about Thor light, medium and heavy duty paving breakers and other Thor contractors' tools, write for Catalog 42-A.



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Shocker story—with a new kind of hero

THE rocky road to destruction—that's what many big, costly tires travel on the kind of tire-shocking work you see above. For there are sledgehammer blows to the tire whenever it hits a rock, rut, or stump—impacts under ton-loads that cause bruises, ply separation, blow-outs, and even a ruined tire. Lost time and repairs from such accidents are costly; a ruined tire means an *extra* loss, perhaps amounting to several hundred dollars.

To protect users of off-the-road tires against such losses, B.F. Goodrich engineers developed a new tire construction principle—the shock-shield. This *shield* gives greater protection against bruises and blow-outs. It is built in under the tread—is a set of four breakers... layers of rubber-coated rayon cord fabric... insulated with thick cushions of special shock-resisting rubber.

When the tire is "hit", the breaker-cords stretch in unison—do *not* criss-cross—and return to their original position. The blow is evenly distributed, *not* concentrated, and is absorbed by the rubber cushions. Thus, the cord body receives only a greatly reduced, eased-off shock.

Records show exceptional results

Users of B.F. Goodrich off-the-road tires report greatly improved tire service records—fewer bruises, twice-as-long wear, reduced repair bills. One operator reports 17,226 miles from BFG tires compared with 12,501 for the best of three ordinary tires used; another, 17,599 miles compared with 6,476 for the best ordinary tire; and a strip mine operator's records show an average of over 4,000 hours of service for BFG Universal tires com-

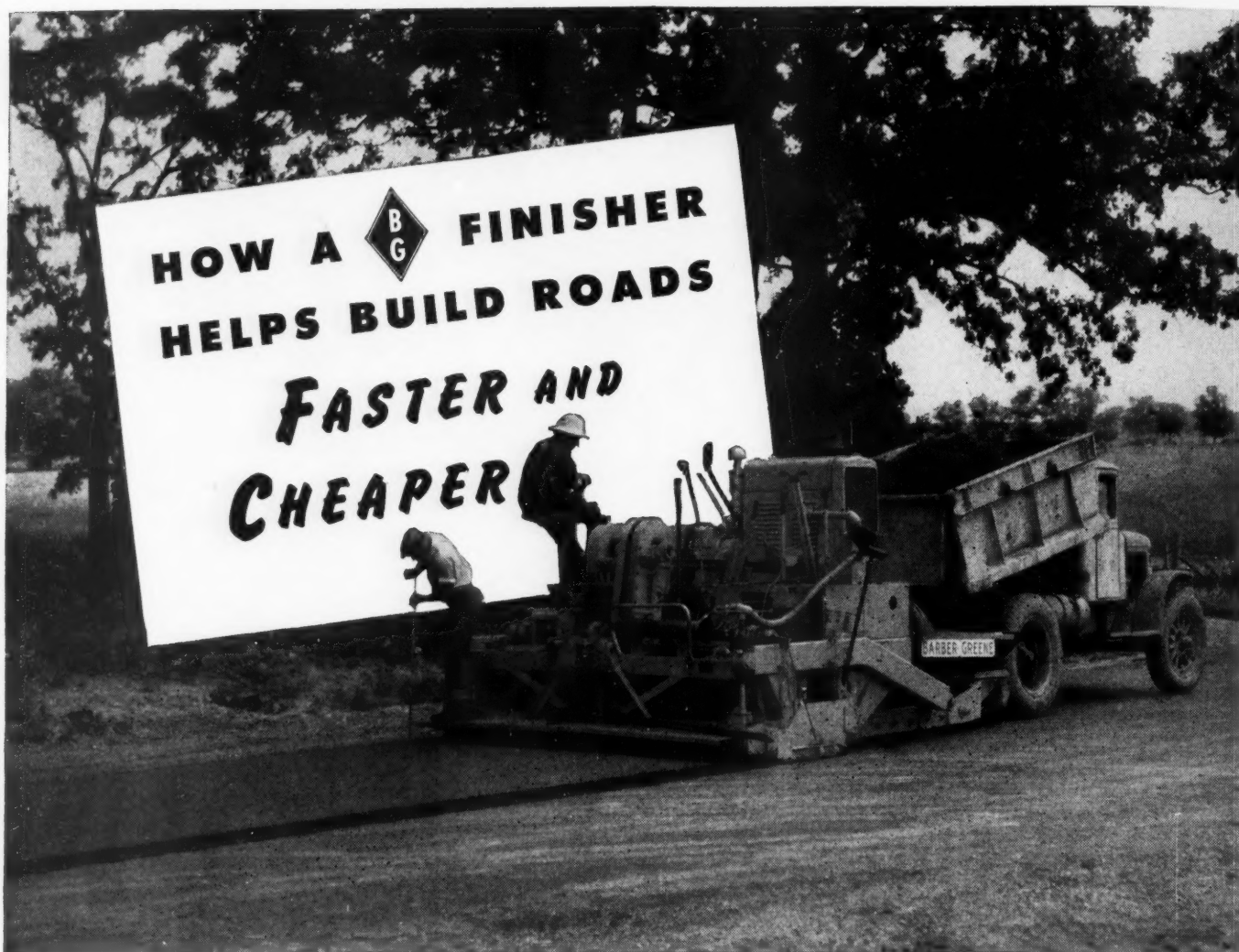
pared to 1,600 hours from another make.

Savings for you

Your off-the-road equipment *can* serve you better, at less cost, if it has the exclusive working advantages of B.F. Goodrich tires. You can prove this in your own comparison tests of BFG tires alongside other makes. We urge you to try it.

To get best delivery of BFG off-the-road tires, place tentative orders early; supplies are limited. See the local B.F. Goodrich dealer or write us direct. *The B.F. Goodrich Co., Akron, Ohio.*

Truck Tires BY
B.F. Goodrich



• Here's a machine that performs three jobs at once. And you can keep it moving steadily—all day long. In rapid succession, truckloads of asphalt mix are mechanically spread . . . "kneaded" and thoroughly tamped in place . . . and automatically leveled—all in one operation.

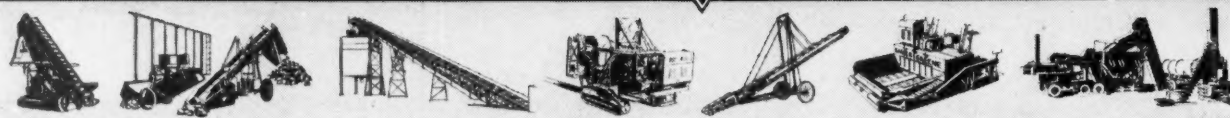
Moreover, the Barber-Greene Tamping-Leveling Finisher helps provide fast, cheap road construction by reducing the amount of rolling for adequate compaction . . . eliminating hand labor behind the machine . . . decreasing truck delay . . . cutting out the hazards encountered in other methods.

You'll find that a B-G Finisher saves

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*Boy—
She sure
goes way
down
there
boss!*

SEE where that dipper is. That's what a Northwest Pullshovel gives you—depth, long reach, high capacity, easy operation, power to handle the toughest digging, perfect mobility—a combination that assures the profitable handling of material, up to 27 foot depth.

The Northwest Pullshovel is the machine for those contracts for tomorrow's municipal expansion, tomorrow's housing and real estate development and perhaps most important of all, you are not tying your money up in a one purpose machine. Your Northwest is quickly converted to a Shovel, Crane or Dragline for any other excavation or material handling problem. Keep it in mind for those future trenching jobs.

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**DOES THINGS
NO OTHER TYPE
TRENCHER
CAN DO!**

OCTOBER 2, 1941



WE RENEW OUR PLEDGE

Two years ago, at the beginning of the present war with its uncertainties and threats to the future of all industry, this Company publicly pledged itself not to increase its selling prices.

On this, the second anniversary, we again publicly renew that pledge.

During the last two years we have not only kept the pledge previously made, but *we have actually reduced our selling prices by more than 6%* because of more efficient operation made possible by the marvelous cooperation and ability of our organization. This was accomplished in the face of rising labor and material costs, both of which have been increased by considerable amounts.

It is our belief that the only hope for the continuance of the present industrial system now threatened from within and without is in its ability to give more and more to the consumer for less and less of his dollar. This is the strength of American individual initiative. This is the hope of our country's future. If American industry can accomplish this universally, we need not fear dictators either at home or abroad.

THE LINCOLN ELECTRIC COMPANY

Cleveland, Ohio
October 2, 1941

J. F. Leavelle
President



STATEMENT OF POLICY

The world is entering a crisis, the result of which no one can foresee. Other wars have brought inflation, followed by unemployment and depression after peace was achieved. America's experience in the World War illustrates this fact.

Much of this post-war trouble would have been eliminated by a more foresighted price policy on the part of manufacturers and distributors. Price inflation by the seller when he had a dominant position resulted inevitably in reaction with deflation, depression and suffering. Many of those price increases were not warranted.

Before such an inflationary cycle of prices is again started, we publicly pledge ourselves, as far as possible, to maintain present prices.

Further, if the materials we buy are increased in price, or the cost of labor is increased, then we pledge ourselves to raise selling prices no more than the bare increase in cost of raw materials and labor going into our products.

Further, we pledge ourselves to pass on to our customers the reduction in cost made possible by better manufacturing methods, wider distribution and technical advances in production.

THE LINCOLN ELECTRIC COMPANY

Cleveland, Ohio
October 2, 1939

J. F. Leavelle
President

OCTOBER 2, 1939



★ ★ OUR PLEDGE MAINTAINED ★ ★

On October 2, 1939, we announced the policy of "no increase in selling prices". A progress report made October 2, 1941, showed we actually had reduced prices by more than 6% during the period 1939 to 1941.

We have adhered to this policy of price reduction throughout the war years. Despite general increases in the costs of labor, materials and distribution . . . and despite governmental regulations . . . we have been able to maintain or reduce our prices throughout the entire period from 1939 to date.

This has been made possible by our incentive system . . . a method which, if it had been applied throughout industry, would have doubled America's output of war goods for a quicker Victory and would have cut the cost of the war by 50%.

America's future depends largely upon her *efficiency of production*. Our proved incentive system has in it the seeds of a satisfactory answer to the difficulties of this nature in industry.

THE LINCOLN ELECTRIC COMPANY

Cleveland 1, Ohio
May 7, 1945
Victory in Europe

J. F. Leavelle
President

Wire Rope Value Begins With Wire

ROPE REMINDERS

Regular inspection of wire rope is necessary for operating efficiency.

And proper rope inspection means, first, examining its entire length to find the most worn or deteriorated spot.

Check the number of broken wires in the worst rope lay—and the rope's diameter at that point. See how much abrasion has occurred on the wires.

Look in the valleys between the strands for rust and pitting. Note carefully, too, the condition of the rope near attached fittings.

If wire breaks have occurred prematurely, check the installations carefully to locate possible causes.

A detailed study made by a Roebling engineer will show whether a more suitable rope is the answer . . . or whether improvements should be made on the installation.

WHAT DETERMINES THE PERFORMANCE you get from wire rope? It's the handling it gets—the equipment it works on—the job to be done.

All these count. But what counts *most* is the rope itself. And that's the reason why you should rig your shovels, cranes and draglines with Roebling "Blue Center" Wire Rope.

For "Blue Center" gives you dependable performance—even under severe and abusive conditions. It's rope quality that begins with wires drawn from finest steel . . . Roebling-made!

To get *best* results from "Blue Center" select the right rope . . . and use it right. Roebling engineers will be glad to show you how. Call or write our nearest branch office.

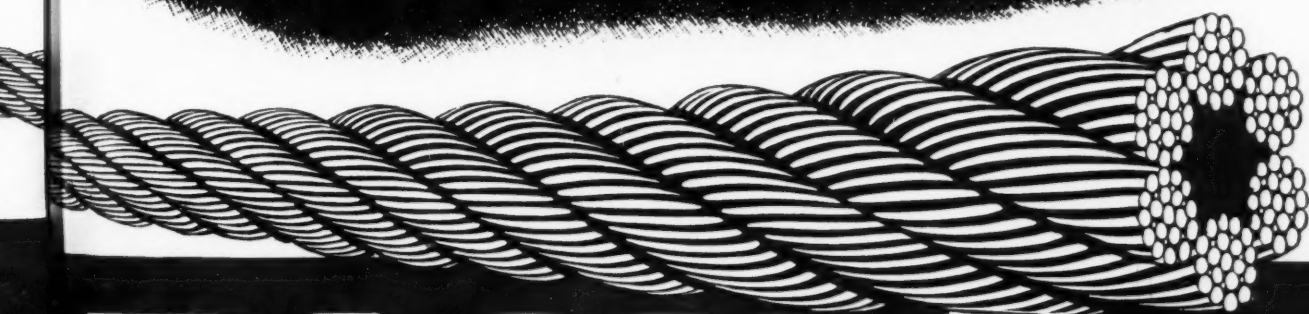
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Ground water at New York's \$100,000,000 airport at Idlewild lies practically at the surface. Material consists of hydraulic fill, meadow mat, and sand—a tough combination in which to excavate trenches eleven feet deep to provide drainage for the runways. But, with a MORETRENCH WELLPOINT SYSTEM handling the water and stabilizing the soil, the rest is easy.

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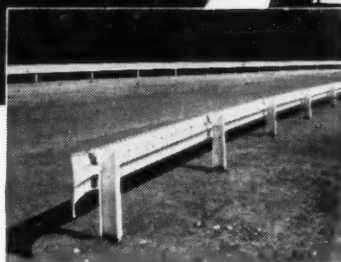
ROCKAWAY, NEW JERSEY

NEW ORLEANS 13, LA.
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How Bethlehem serves HIGHWAY BUILDERS



REINFORCING STEEL—Bethlehem Bar Mats, made of deformed bars clipped together, are easy and convenient to install, and lie flat.



HIGHWAY GUARD—Bethlehem's beam-type guard rail, called the Safety-Beam, is made in standard 12 ft., 6 in. lengths, or can be supplied in lengths up to 50 ft.



**BETHLEHEM PRODUCTS
FOR HIGHWAYS**

THERE'LL be a great army at work—perhaps as many as 7,000,000 men—when postwar highway and bridge building gets under way.

Your district will have its part in this big, constructive peacetime push. You may have already figured out your manpower needs, and how your logistics—the fine art of keeping supplies moving to the front—will work out.

Make Bethlehem the G.H.Q. for your road and bridge steel needs. Bethlehem can supply every one of the many steel items needed to build a modern concrete highway, and bridges. There's a Bethlehem warehouse near you, and all you'll need to do to get your complete road steel order moving fast is to put in a telephone call.

For full information get in touch with the nearest Bethlehem district office, or write direct to Bethlehem Steel Company, Bethlehem, Pa.

Road Joints • Center Strip • Dowels
Dowel Bar Supports • Reinforcing Bars
Bar Mats • Bar Ties • Reinforcing for
Concrete Pipe • Bridge Floor Reinforcing
• Concrete Slab Spacers • Welded
Wire Fabric • Guard Rails • Guard
Posts and Brackets • Wire Rope and
Strand • Right-of-Way Fence and Posts
Anchor Rods • Pipe • Hollow Drill Steel
Digging Bars • Structural Steel • Mold
Boards • Corrugated Sheets • Turn-
buckles • Tie Rods, Spikes, Bolts
and Nuts • Timber Bridge Hardware
Sheet and H-Bearing Piling.



"Enginairing"

helps to **cross** mountains and helps to **move** them!

When mile-long trains of war materials must cross a mountain, the powerful locomotives can do only part of the job. The locomotives can take trains up the grades but the brakes are relied on to get them down . . . and that's where "Enginairing" has played a vital part.

Uniform brake application and release throughout the train are required to assure smooth handling and thereby protect lading and equipment. Enginairing developed the necessary qualities. The braking impulse travels the length of the train in approximately the time that the

sound of the whistle travels from engine to caboose. By a few inches of movement of a small handle, the engineer commands a hundred cars or more.

The same Enginairing that has helped the railroads work transportation miracles, is helping industry, too. On modern earth-moving equipment, for instance, the operator need no longer muscle heavy levers. Instead, with the touch

of a finger, he moves the handles of small W-A-B controls . . . and governs an entire cycle of operations. The actuating mechanism can be designed to handle any force from ounces to tons. Interlocks can be provided, to safeguard equipment from damage through incorrect manipulation.

Enginairing can make a big contribution to modernizing products and

improving production, in post-war times. When that day comes, remember that our 76 years of Enginairing experience will be ready and willing to serve you.

WESTINGHOUSE AIR BRAKE COMPANY

INDUSTRIAL DIVISION

General Offices:
WILMERDING, PA.



WABCO PACKING



COMPRESSORS



REMOTE CONTROLS



For the LOW BIDS Ahead!

GAR WOOD ROAD MACHINERY

WITH ALLIS-CHALMERS DIESEL POWER

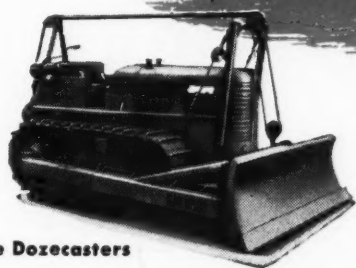
Make your share of the huge after-Victory program of road building and construction a profitable share. All out competition and low bids will be the rule. Your profit margins will depend largely on your ability to cut the costs of getting jobs done.

For lowest costs in all of your earth moving operations, you can count on Gar Wood Road Machinery and Allis-Chalmers Diesel Power. This is the combination with proved ability to make fast work of the toughest jobs. It is the choice of many leading contractors on the basis of actual savings in operating costs. Make these savings yours. Get the facts about Gar Wood Road Machinery from your Allis-Chalmers dealer.



SPECIFY GAR WOOD

FOR OUTSTANDING PERFORMANCE



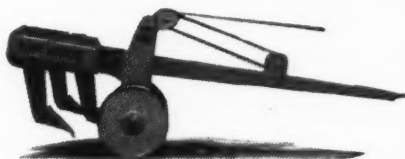
Cable Dozercasters



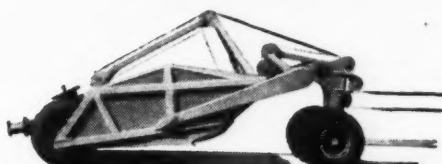
4-Wheel Hydraulic Scrapers



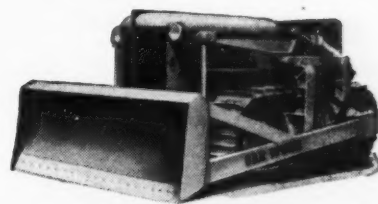
2-Wheel Hydraulic Scrapers



Heavy Duty Rippers



4-Wheel Cable Scrapers



Hydraulic Bulldozers

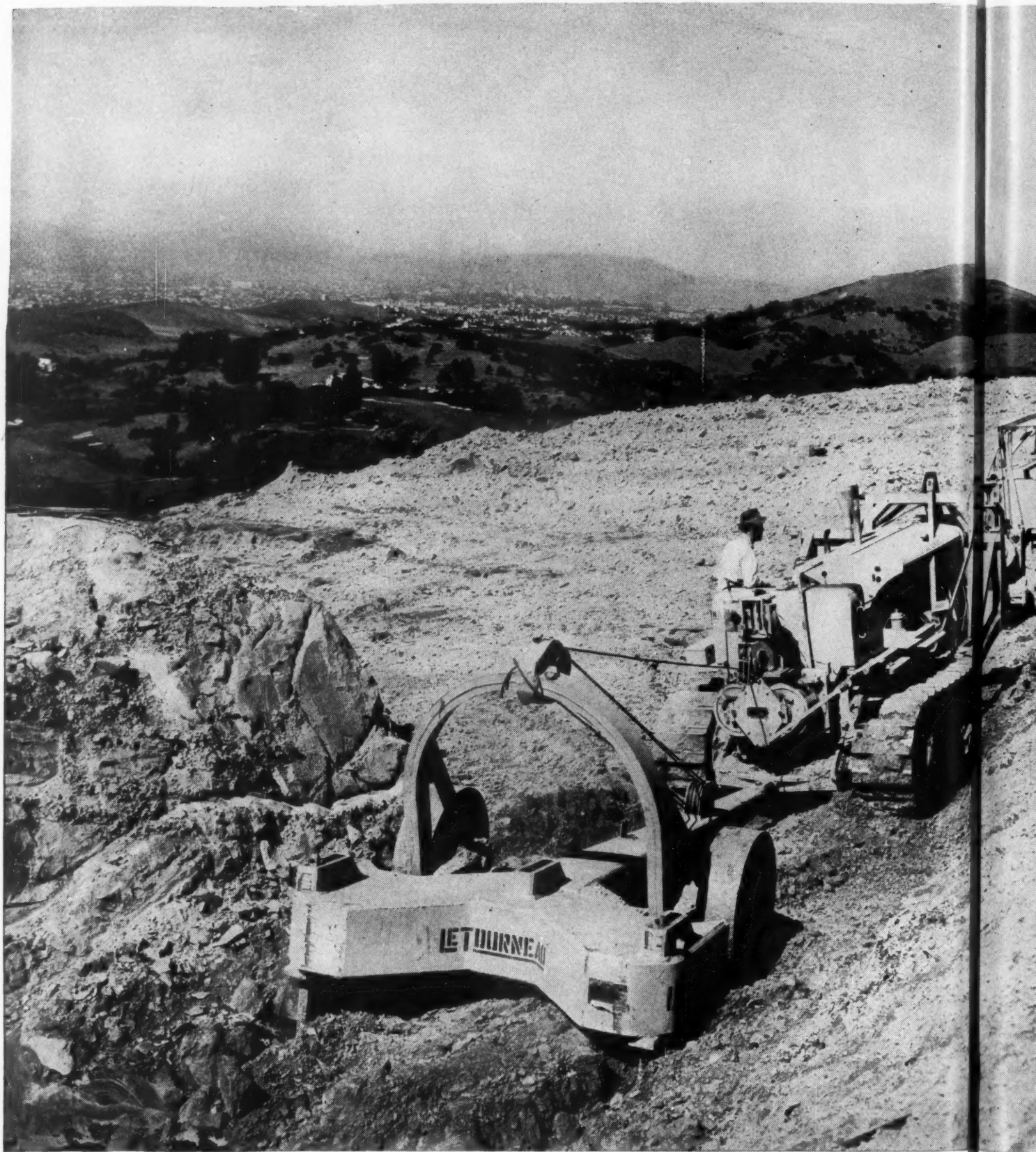


GW ROAD MACHINERY
is Sold Through
ALLIS-CHALMERS
Dealers Everywhere

ROAD MACHINERY DIVISION

GAR WOOD INDUSTRIES, Inc.
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OTHER GAR WOOD PRODUCTS: HOISTS AND BODIES • WINCHES AND CRANES • TANKS • HEATING EQUIPMENT • MOTOR BOATS



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TEXACO STAR THEATRE
WITH JAMES MELTON
EVERY SUNDAY NIGHT—CBS



TEXACO



WAITING...

158,466 Miles of Roadwork

IMAGINE *fifty* transcontinental highways, or a road running *six times around the earth* at the equator. That will give you an idea of the estimated mileage of roads scheduled to be rebuilt, widened and relocated after the war. *And this is only one item in an estimated \$15 billion expenditure for postwar construction!*

To handle this unprecedented volume of work, construction equipment—old and new—must function at maximum efficiency, with minimum maintenance. Effective lubrication is the biggest single factor in assuring this... and, on the basis of experience, contractors everywhere use Texaco.

Texaco Marfak, for example, used in your tractors, shovels, bulldozers, trucks, etc., provides ideal film lubrication inside a bearing, yet maintains its original consistency at the outer edges... sealing itself in, sealing out sand, dirt, water. Its tough adhesive film cushions bearings against road shocks. Makes parts last longer.

For wheel bearings, use *Texaco Marfak Heavy Duty*. It stays in the bearings—off the brakes. Seasonal repacking is no longer required.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed below.

Texaco Lubrication Engineering Service is available through more than 2300 Texaco distributing plants in the 48 States. Get in touch with the nearest one, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and railroad cars

in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT



Accurate, Low-Cost FINEGRADING ...with a Buckeye R-B Power Finegrader

TODAY, with labor at a premium and speed a necessity, there is more than ever, a need for accurate, high-speed sub-grading. The R-B Power Finegrader cuts the grade exactly to specifications — ready for the paving crew. Gone is the need for shoveling and raking to fill in the low spots, level off the high ones. In all kinds of soil, from sticky gumbo to hard, rock-laden top-soil, the Finegrader does the grading job quickly and accurately. And at the lowest possible cost in time and manpower. Write today for all the details of this profit-making grading equipment.



Built by Buckeye

Buckeye Traction Ditcher Co., Findlay, Ohio



Convertible Shovels



Trenchers



Tractor Equipment



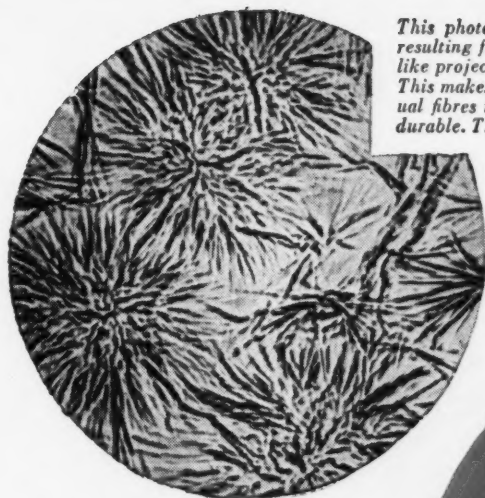
Road Wideners



R-B Finegraders



Spreaders



This photomicrograph shows the distinctive lead "soap" formations resulting from Red Lead's reaction with the vehicle. Note how the rod-like projections radiating from central cores spread out and intermesh. This makes a strong, flexible, interwoven structure—just as the individual fibres in a piece of cloth are intertwined to make cloth tough and durable. This type of soap formation is unique with "lead" paint films.

unique LEAD SOAPS...



another important reason why **RED LEAD** means Extra Rust Protection

Why is Red Lead outstanding as a metal protector?

One of the major reasons is this pigment's remarkable ability to impart to the paint film strong, tough, intertwining lead "soap" formations—as shown in the photomicrograph above.

These unique lead "soaps" improve the paint film in many ways. For one thing, they form a dense, intermeshing matrix which restricts the passage of water through the film. And rusting does not take place without the presence of moisture.

For another, they *mechanically* reinforce the film, giving it extra strength and toughness.

And again, Red Lead "soaps" contribute all-important *elasticity*—allowing movement along their intermeshing projections. This action helps prevent the ruptures to which a hard, unyielding film is subject. Moreover, when a paint film dries and ages, decomposition of the vehicle sets in. But, because of Red Lead's ability to combine with the decomposition products and form soaps, it increases both the durability of the paint film and its adhesion to the base metal.

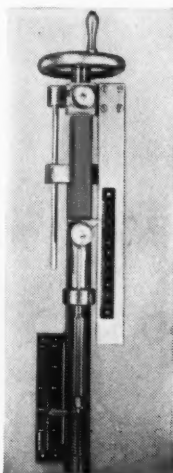
Red Lead's extra strength, toughness and elasticity are demonstrated by the ten-

sile strength test below and substantiated by exhaustive research and field service.

Remember, too, that Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including phenolic and alkyd resin types.

Specify **RED LEAD** for All Metal Protective Paints

The value of Red Lead as a rust preventive is most fully realized in a paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint.



In this tensile strength test a typical Red Lead paint film has been stretched 18% without breaking. In withstanding this elongation it has maintained a load of 920 grams. Any film that exhibits these characteristics has unusual strength, toughness and elasticity. As metals expand and contract only a fraction of one percent, this film would adhere under the most extreme conditions.

No matter what price you pay, you'll get a better paint for surface protection of metal, if it contains Red Lead.

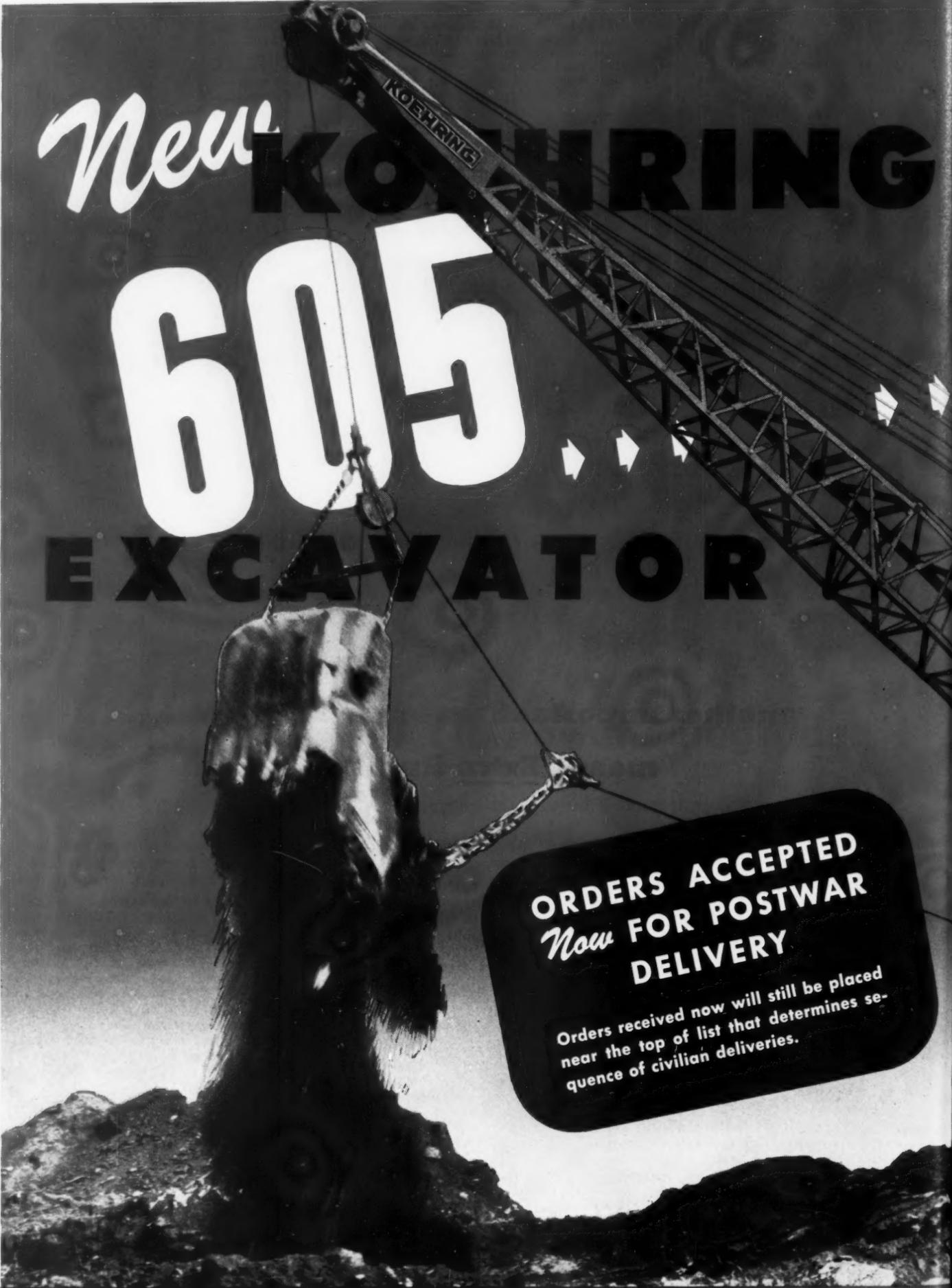
Write for New Booklet—"Red Lead in Corrosion Resistant Paints" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas—ranging from Red Lead-Linseed Oil paints to Red Lead-Mixed Pigment-Varnish types. If you haven't received your copy, address nearest branch listed below.

All types of metal protective paints are constantly being tested at National Lead's many proving grounds. The benefit of our extensive experience with Red Lead paints for both underwater and atmospheric use is available through our technical staff.



NATIONAL LEAD COMPANY: New York 6, Buffalo 3, Chicago 80, Cincinnati 3, Cleveland 13, St. Louis 1, San Francisco 10, Boston 6 (National-Boston Lead Co.); Pittsburgh 30 (National Lead & Oil Co. of Penna.); Philadelphia 7 (John T. Lewis & Bros. Co.); Charleston, W. Va. (Evans Lead Division).

DUTCH BOY RED LEAD



New **KOEHRING**
605
EXCAVATOR

ORDERS ACCEPTED
Now **FOR POSTWAR**
DELIVERY

Orders received now will still be placed
near the top of list that determines se-
quence of civilian deliveries.

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New **KOEHRING 605**

POSTWAR 1½-YARD EXCAVATOR and 25-TON CRANE

Be among the first to earn greater profits with the new, designed-for-tomorrow 605, latest, but not the last, addition to the Koehring Postwar Line. New ideas in Heavy-Duty excavator design, tested and proven. Plus outstanding, exclusive advantages of earlier Koehring excavators. Greater operating ease. Higher production. More engineered-in strength. Order your Koehring 605 today to get earliest possible delivery.

KOEHRING COMPANY • MILWAUKEE 10, WISCONSIN

*Plan Now to
Own One*



HEAVY DUTY CONSTRUCTION EQUIPMENT

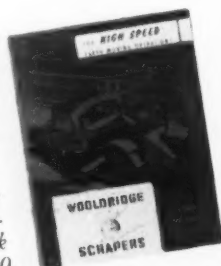


True directional steering of Wooldridge Terra Cobra, high-speed, self-propelled Earthmovers is unique in the field of two-wheeled units. At no time is one wheel required to pull the entire load, even on sharp turns or in soft earth. This results in less strain and wear on

equipment and operators, insuring higher hourly averages throughout each daily shift. In a Wooldridge Terra-Cobra positive steering control is combined with positive two wheel power and speed at all times. Investigate fully. Get the full details.

**WITH POWER
MAINTAINED
ON BOTH WHEELS
AT ALL TIMES**

WRITE TODAY
for twelve-page Bulletin No. TA-425.—
And if you are also interested in Heavy-duty scrapers or other earth-moving equipment, ask for Bulletin No. W-210.



WOOLDRIDGE MANUFACTURING CO.
SUNNYVALE • CALIFORNIA



GUTS *to take it...*
GUTS *to give it...*

**A Blackhawk Hydraulic Jack is
Built to Stand
the Gaff in**

*Industry and
Construction!*



The Blackhawk wartime line includes Hand Jack models in 3, 5, 8, 12, 20, 30 and 50 tons capacity.

When you need a jack, buy the best—buy Blackhawk from your Industrial Supply Distributor.

A Product of **BLACKHAWK MANUFACTURING CO.**
Dept. J2375, Milwaukee 1, Wis.

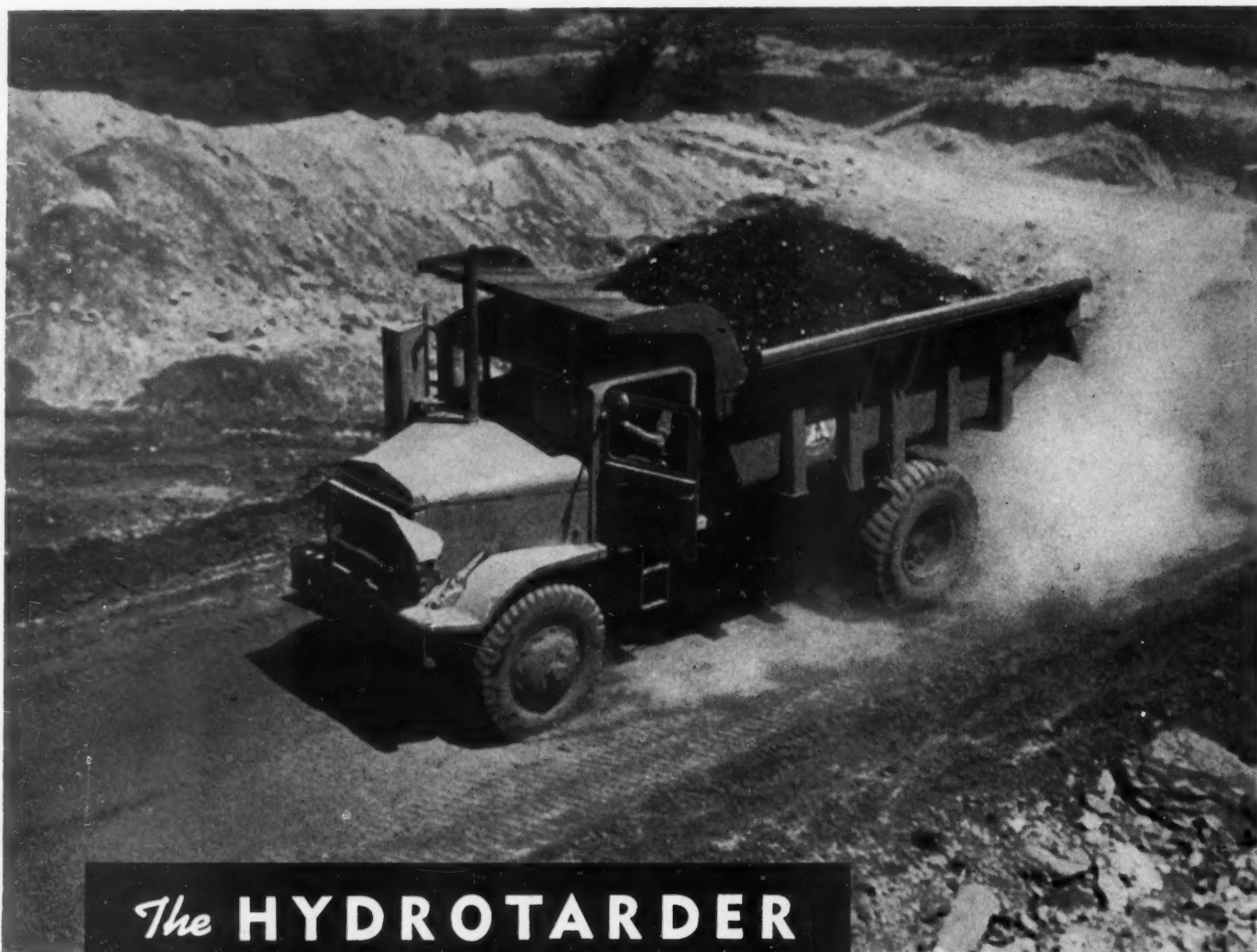


This seal is found only on Blackhawk Hydraulic Jacks—your assurance of a wise and safe investment.



BLACKHAWK

THE BIG NAME IN HYDRAULIC EQUIPMENT



The **HYDROTARDER**
Lowers Operating Costs - - -
Provides Greater
Safety, Economy, and Speed

This Byron Construction Company Euclid truck, equipped with Hydrotarder, hauls 16 tons of coal with safety on a 16% grade between a strip mine and tippie near Clarksburg, West Virginia.

Are you still depending on mechanical brakes to control the speed of heavily loaded trucks on down grades? If you are, you're missing the greatest single advancement ever made in automotive braking—the Parkersburg Hydrotarder.

A truck equipped with a Parkersburg Hydrotarder can descend the steepest grades in perfect safety and without using the mechanical brakes or engine to help control its speed. And because it operates independently of the mechanical

brakes the Hydrotarder cannot cause a truck to skid or jack-knife.

In addition to completely solving braking problems, a Parkersburg Hydrotarder will soon pay for itself in savings on fuel, oil, tires, brakes, and engine maintenance. One contract hauler reports 25% saving in tires, 8% saving in fuel, 85% saving in friction brakes and 15% saving in time.

If your trucks are operating in hilly country on off-the-road locations where braking is a problem, write today for complete details and prices.

Parkersburg
HYDROTARDER

THE PARKERSBURG RIG & REEL COMPANY

PARKERSBURG, W. VA.

Manufacturers since 1931 of the famed Hydromatic Brake—the load retarder which makes possible the drilling of deep oil wells safely and economically. Its counterpart, the Hydrotarder, enables motor transportation to operate with greater safety, economy, and speed than was ever heretofore believed possible

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HERE'S
WHY

HEIL CABLE SCRAPERS

unload faster and cleaner
... with less cable pull



Heil Hi-Speed Bottom Dump Wagons help you establish speed and yardage records.



Heil "engine-mounted" Cable Dozers move more "pay dirt" speedily, dependably.

Heil engineers have done a thorough job of designing this big-capacity cable-scoop. You get speed, flexibility, and scientific weight distribution — to help you get bigger yardage at lower cost, along with a reputation as a successful operator.

• Unloading clean and fast with less cable pull is only one of many features that give you maximum yardage per hour — maximum productive hours on the job. Write for bulletins describing famous Heil design features such as correct bowl design, scientifically located draft-pivot point, fulcrum-type lift, all-welded construction, etc., or —

See Your INTERNATIONAL TRACTOR DISTRIBUTOR



THE HEIL CO.

GENERAL OFFICES

MILWAUKEE 1, WISCONSIN

R-49

Tilting Floor Push-out

About a third of the load rolls out by gravity, through high-opening front apron. Balance is ejected by moving the tilting floor upward and forward. Hinged tilting floor scrapes sides of bowl clean, hinged section at rear scrapes back sheet clean. Dirt has no chance to stick.



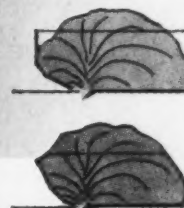
Tilting is easier than pushing

It requires less power to raise and dump a load than to slide it forward against friction. Tilting also gives greatest leverage at the start of the unloading cycle, when load is heaviest — and a speed-up as the load is dumped, maintaining an even discharge.



Correct Bowl-Loading Action

Ordinary scrapers with a square-back bowl load with a void in the rear if operator stops digging when crown of dirt shows over top of bowl, resulting in less payload. Heil Scoops have the two features which make for good loading action (1) correct pitch of cutting blade (2) correct shape of bowl.



An HOUR of Application...



...May add MONTHS of use

Scraper blades for pug mills, road machinery or silica grinders like the one above can be treated with a strip of MIR-O-COL No. 2 (Production) hard-facing metal in from 30 minutes to an hour of weldor's time. This time, plus the low cost of the alloys, can be offset by the logged gain in operation efficiency and

production life. Gears, sprockets, all types of bucket teeth, diagonal rolls, charging rams, cams, dies and many other points where metal meets wear, are being surfaced today with MIR-O-COL metals. Learn how this fast-flowing metal can earn more operating profits for you. Write today for your distributor's name.

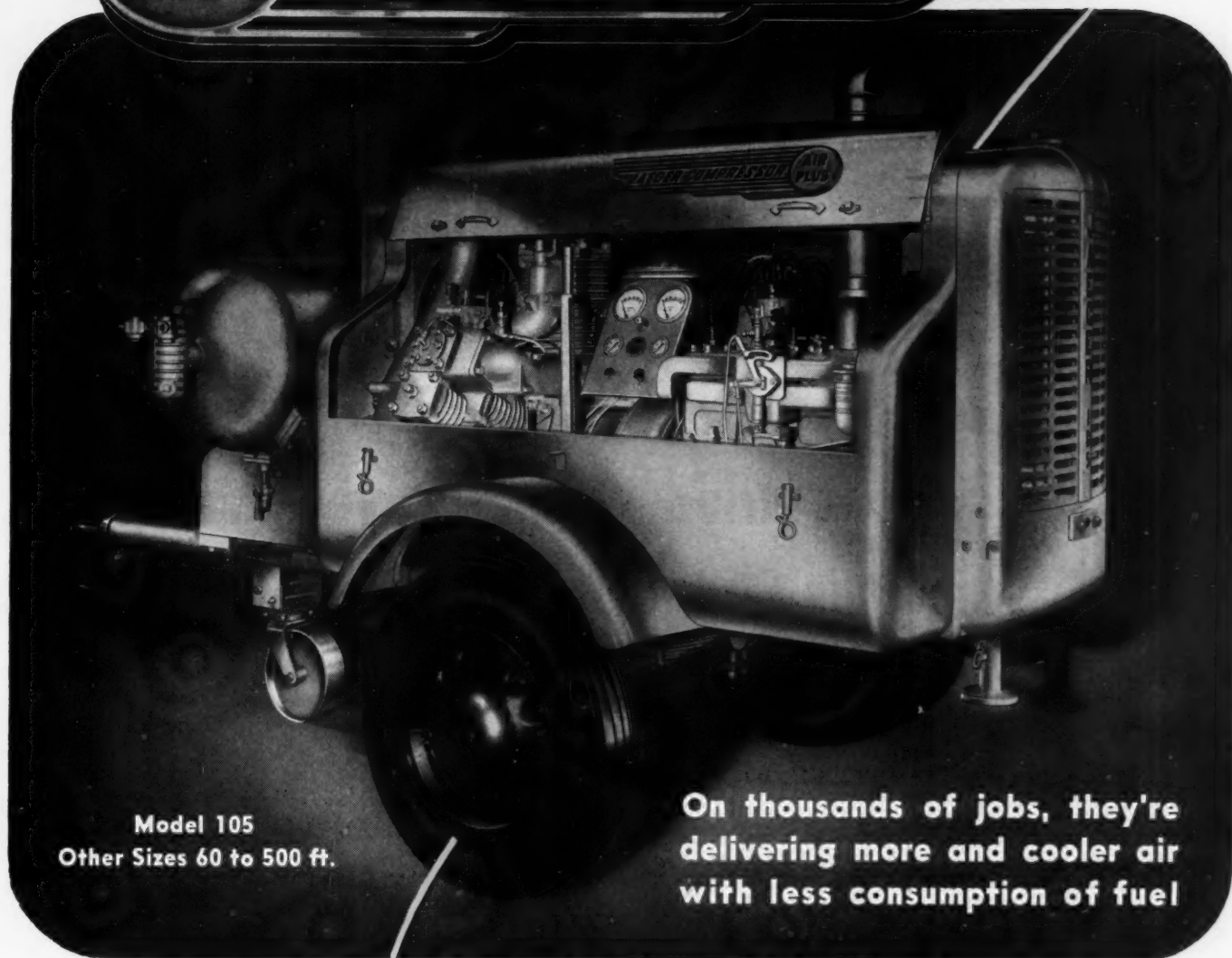
ASK FOR THIS BOOK
Send your name and address to MIR-O-COL Alloy Company for your FREE copy of "Weldor's Guide to Successful Hard-Facing." Also indicate if you wish to receive a monthly copy of MIR-O-COL News.



MIR-O-COL
HARD-FACING RODS
ALLOY COMPANY

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AIR PLUS JAEGER COMPRESSOR



Model 105
Other Sizes 60 to 500 ft.

On thousands of jobs, they're
delivering more and cooler air
with less consumption of fuel

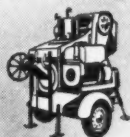
Built to aircraft engine precision, in a balanced design that eliminates vibration, these rugged, big-valved, force-feed-lubricated compressors deliver their rated capacity at 20% to 30% slower piston speeds, with a notable economy in fuel and upkeep costs. To this efficiency of performance are added greater "roadability," lifetime clutches and bearings, bigger engines, air receivers, tool boxes and many "AIR PLUS" features fully described in Catalog JC-5. Ask for your copy. THE JAEGER MACHINE CO., Columbus 16, Ohio.



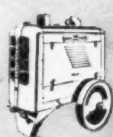
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"FLEET-FOOT"
Loaders



"SPEEDLINE"
Concrete Mixers



"SURE PRIME"
Contractors Pumps

JAEGER *Engineered* EQUIPMENT

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS
PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS,
AGITATORS—JAEGER HOISTING ENGINES, TOWERS

MORE THAN

You get **COMPLETE LUBRICATION SERVICE**
—designed specifically for Contractors—when
you call **SOCONY-VACUUM!** This new time-saving
service includes field-proved maintenance
schedules—regular on-the-job deliveries and
other custom-planned benefits.



SOCONY-VACUUM OIL COMPANY, INC., and Affiliates:
Magnolia Petroleum Co., General Petroleum Corp. of Calif.

"GAS AND OIL"

EVERY DETAIL of this new service has been planned to help you come out *ahead* in your constant race against time! Out on the job—in your maintenance department—all through your operation, it eases pressure—saves time.

Now, more than ever before, a single breakdown can paralyze a whole team of machines. That's why it is so vitally important to give every part maximum protection. With our *complete* line of quality lubricants, you're sure of getting exactly the *right* oil or grease for every application! No danger of having to make the wrong lubricant "do"—no waiting around for special orders—no necessity for follow-ups.

To help keep interruptions and inventory problems at a minimum, your Socony-Vacuum Repre-

sentative arranges automatic on-the-job deliveries. He'll also supply you with job-tested maintenance schedules—help your men adapt them to your specific needs and put them into operation.

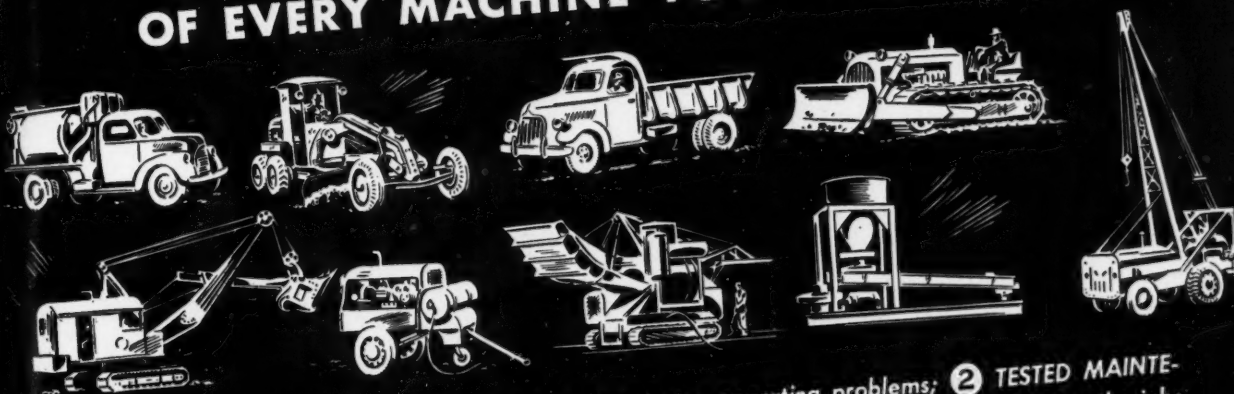
Additional Socony-Vacuum "plus" services include engineering aid when needed and free training on the Correct Lubrication for every machine you use.



Instead of getting fuels and lubricants, alone, call in Socony-Vacuum and get Complete Lubrication Service for Contractors!

**"ON YOUR STAFF—BUT
NOT ON YOUR PAYROLL"—**
Your Socony-Vacuum Representative

CORRECT LUBRICATION FOR EVERY PART OF EVERY MACHINE YOU OPERATE . . .



PLUS

- ① ENGINEERING HELP on time-losing operating problems;
- ② TESTED MAINTENANCE SCHEDULES that minimize service man-hours—keep equipment on the job;
- ③ PROMPT, DEPENDABLE DELIVERY—a reliable, on-the-job service that eliminates inventory problems for you!

"INFORMATION PLEASE" returns from vacation September 10. Until then, hear Rise Stevens and Hollywood Music—Mondays 9:30 P. M., E. W. T., NBC

Take the full load sooner!



BREAKING IN

the new line is a short job with
PREFORMED YELLOW STRAND

Let's agree that "slow and easy" is a good rule for putting most equipment to work — *Preformed Yellow Strand* included. Proper adjustment between wire rope and other operating parts extends rope life.

But a prolonged slow-down for starting a new rope is expensive. And it's *unnecessary* with *Preformed Yellow Strand*, because the factory process that preshapes wires and strands is equivalent to a *preliminary break-in*.

When flexible *Preformed Yellow Strand* reaches you it is notably relieved of internal stresses. You save much of the time that would be spent

trying to relax the stiffness of a corresponding unpreformed rope. After a short, gradual stepping up—to bed the strands firmly on the core—you can take the full load.

The same rope tractability aids production in other ways. *Preformed Yellow Strand* is installed quickly. It resists kinking...stays in the sheave grooves...curbs

overwinding on the drum.

Specify *Preformed Yellow Strand* by name. Get all you should in wire rope performance and economy. Broderick & Bascom Rope Co., St. Louis 15, Mo. *Branches:* New York, Chicago, Houston, Portland, Seattle. *Factories:* St. Louis, Seattle, Peoria.

HAND BOOK FREE: "Industrial Wire Ropes" contains useful facts, tables, pictures. Write for your copy.

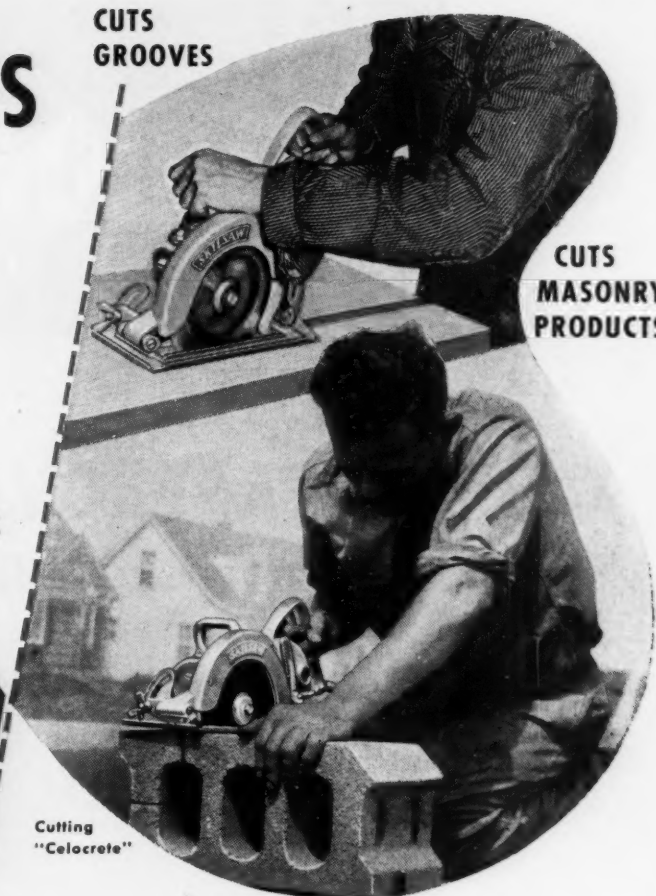


SKILSAW SAVES MORE TIME MORE WAYS



CUTS
METALS

CUTS
COMPO-
SITIONS



CUTS
GROOVES

CUTS
MASONRY
PRODUCTS

Cutting
"Celocrete"

It's no news that SKILSAW is the finest time-saving tool you can own for making all the ordinary cuts in lumber. But there's lots of other work that SKILSAW can do . . . and do it faster, easier, better. Grooving, for instance . . . cutting sheet metals, compositions, asbestos cement and all masonry products . . . just an example of many unusual cutting jobs where SKILSAW can help you build faster and more profitably.

Phone your SKILTOOL Distributor today for a demonstration . . . find out how SKILSAW can save more time in more ways than any other tool you can own.

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PORTABLE ELECTRIC SKILTOOLS

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SKILSAWS



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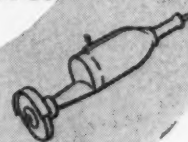
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SKILGRINDERS



SKILDRILLS

TOMORROW'S SHOVEL

TESTED • PROVED APPROVED

**Soon available to shovel
users...for excavating
and material handling**

The speed required in mobile, mechanized warfare now results in new speedy mobility for power shovels and cranes.

Here is Byers "Traveler", a half yard shovel (convertible to all attachments) which sets new high standards for efficiency, output and performance. Until recently available only on high priorities... soon available to all shovel and crane users for general excavating and material handling. You can profit with the following outstanding features:—



1. Self Propelled . . . around the job or on the highway.
ELIMINATES TRAILER
2. One man operated . . . All controls conveniently grouped for operating or steering by the one operator.
ELIMINATES SECOND MAN
3. 4-wheel drive . . . 6 wheel traction, mud grip tires.
SPECIALLY ENGINEERED CHASSIS
4. Digs all around... Over front, sides, back.
A FULL CIRCLE MACHINE
5. Air controls, hydraulic brakes. Power steer.
NOT AN "OLD" DESIGN MODERNIZED
6. New smooth "Airflex" cool internal expanding clutches.
FREE FROM ADJUSTMENT AND REPAIR
7. Enclosed gears running in flowing oil.
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it carries itself at truck speeds.

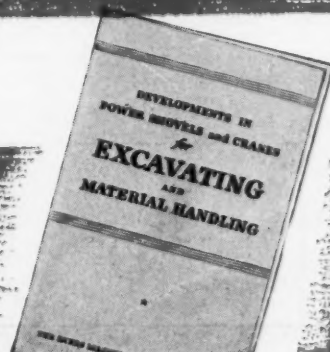


INQUIRE TODAY for this valuable booklet that tells
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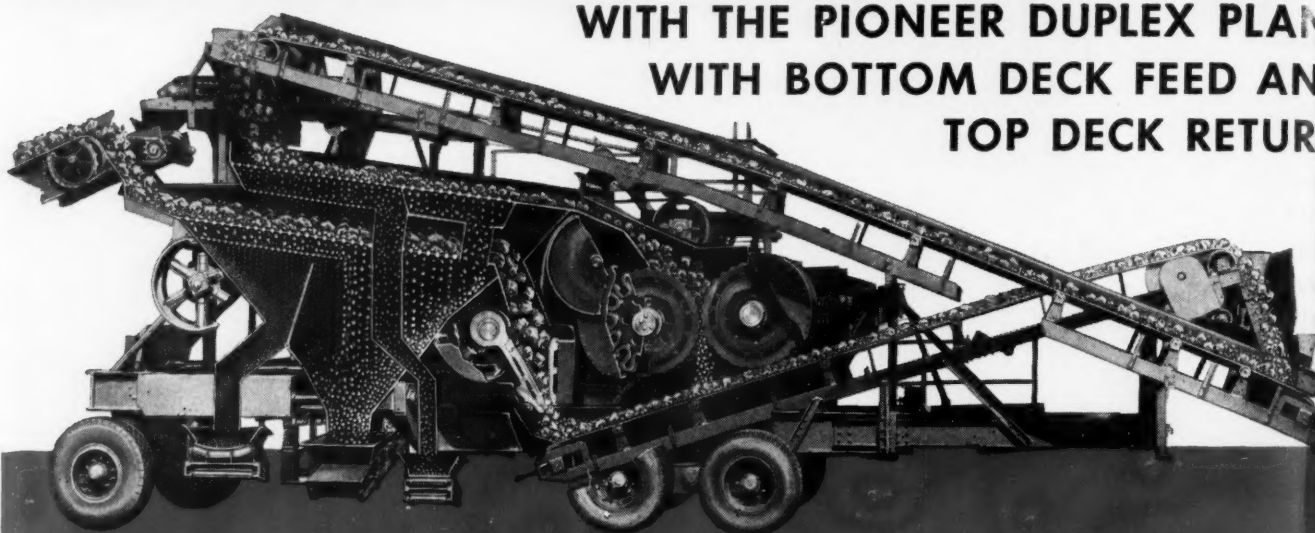
RAVENNA, OHIO

Distributors Throughout The World



WINSTON BROTHERS . . .

Make The **MATERIAL** Meet



WITH THE PIONEER DUPLEX PLANT
WITH BOTTOM DECK FEED AND
TOP DECK RETURN

HERE'S WHAT THE PLANT HAD TO DO

The job called for the production of dense, graded surface coarse aggregates and cover aggregates from a pit that was short of acceptable sand and contained an excess of clay and fines.

Winston Brothers brought this data to Pioneer engineers. It was established that to make the pit produce the specification it was necessary for the gravel and screening plant to do the following jobs: Crush oversize over 1" • Reject excess quantities of No. 200 minus • Reject the No. 40 minus because it did not meet the specification as shown by the liquid limit or plasticity index • Produce the No. 10 material in the crushers • Produce and separate the stone chips for cover aggregate.

THE SPECIFICATION

SURFACE COARSE		COVER AGGREGATE	
PASSING	%	PASSING	%
1"	100	1/2"	100
3/4"	85-100	3/8"	90-100
No. 4	45-65	No. 10	0-5
No. 10	30-50	No. 200	0-2
No. 200	5-10		

Liquid Limit—Maximum allowance 25.

Plasticity Index—Maximum allowance 6.

THE TEST OF THE GRAVEL PIT

3"	69%	No. 4	32.4	Liquid Limit—test 35.
1"	53.5	No. 10	28.9	Plasticity
3/4"	49.0	No. 40	25.0	Index—test 17.
		No. 200	17.0	

HERE'S HOW THE PLANT DID THE JOB

To perform all these tasks efficiently and at low cost, a Pioneer Vibrator Duplex Plant was selected. It is the only standard gravel plant that could make the pit fit the specification because of its exclusive "Bottom Deck Feed."

In the Pioneer "Bottom Deck Feed" plant, the pit run material is screened on the bottom deck so the pit fines, of which there was an excess, were removed through the sand screen.

Crushed material is screened on the top deck so that by using a 3/8" opening in the first half of the top deck and a 1/8" opening in the middle deck it was possible to produce "stone chips" and save the crusher fines in the coarse aggregate.

To make this material meet these specifications Winston Brothers selected a Pioneer 34-V Duplex Crushing Plant. They found it was the only standard gravel plant that could make the material meet the specifications—because of its exclusive "Bottom Deck Feed".

They fed the pit material onto the bottom deck and rejected the pit fines through the sand screen. Crushed material was returned to the top deck and crusher fines were mixed with the coarse aggregate. By using 3/8" screen in the first half of the top deck and a 1/8" screen in the middle deck, it was possible to produce "stone chips".

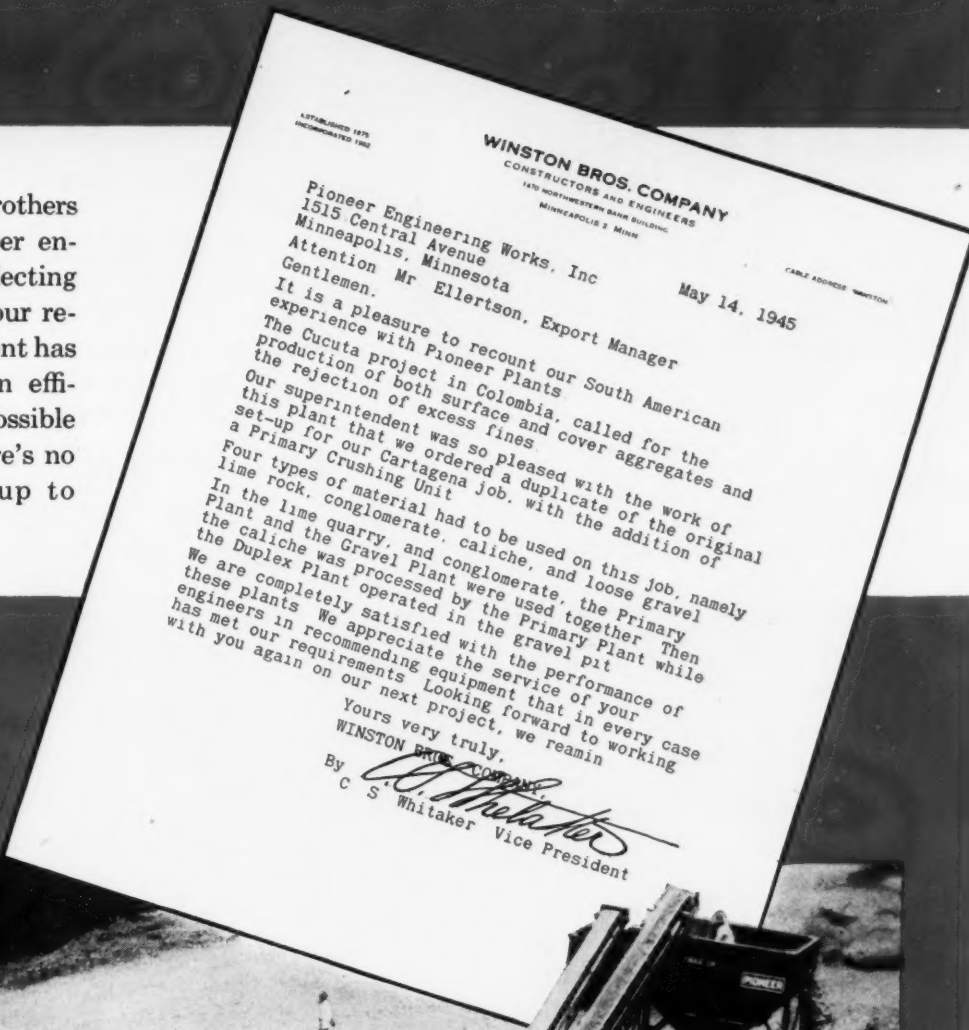
Oversize from the bottom deck was crushed in the jaw crusher and returned to the top deck. Oversize from the top deck was crushed in the roll crusher.

Thus Winston Brothers were able, in one portable plant, to crush oversize . . . reject pit fines . . . and produce surface coarse aggregate . . . and cover aggregate.

TOUGH SPECIFICATION

The experience of Winston Brothers is typical of the way Pioneer engineers work with you in selecting equipment that will meet your requirements. Pioneer equipment has extra margins of production efficiency to make the highest possible production and profits. There's no obligation in putting it up to Pioneer.

Here's the Pioneer plant that Winston Brothers used at Cucuta to make the Material Meet the Specifications.



Pioneer
ENGINEERING WORKS

Jaw Crushers • Roll Crushers • Screens • Conveyors • Feeders • Washers

ENGINEERS and
MANUFACTURERS of
QUARRY-GRAVEL
and
MINING MACHINERY

Avoid oil becoming heavier in crankcases ... use

Stanolube HD

Many fleet operators are aware that when crankcases are drained, the oil sometimes seems heavier than when it was installed. That's because under high temperature, heavy duty service some oils "thicken", that is, actually increase in viscosity. An SAE 30 grade oil may increase to an SAE 50 or 60.

Oils that become heavier in service may cause considerable engine trouble such as over-heated engines, ring sticking, and excessive cylinder and bearing wear.

Here is another problem which Stanolube HD can help you solve. In heavy duty service, Stanolube HD will not increase in viscosity as rapidly as con-

Comparison of Viscosity Increase in various oils

	S.A.E. grade at start of test	S.A.E. grade at end of test
Stanolube HD	S.A.E. 30	S.A.E. 30
Average of 10 approved* oils .	S.A.E. 30	S.A.E. 40
A high grade conventional oil .	S.A.E. 30	S.A.E. 50

*Approved for use by Army Specification 2-104 B

All of the above oils were subjected to the same test—one of the tests required for approval under Army Specification 2-104 B. Stanolube HD showed less viscosity increase than any one of the ten oils tested and considerably less than the average of all.

ventional oils, and there is only a slight difference in viscosity between new and used Stanolube HD.

Viscosity or body increase in used oil is primarily caused by oil oxidation. Stanolube HD has an effective oxidation inhibitor and detergent additive, which not only reduces oxidation of the oil, but keeps oxidation products from settling in the engine and helps eliminate them when the oil is drained. This also prevents a new fill of oil from becoming contaminated with such oxidation products.

To avoid the excessive maintenance and high cost caused by increased oil viscosity, use Stanolube HD. You can be sure you have the right grade of oil throughout the life of each engine fill. A Standard Oil Automotive Engineer can point out many other cost-saving advantages of Stanolube HD.

Buy more War Bonds

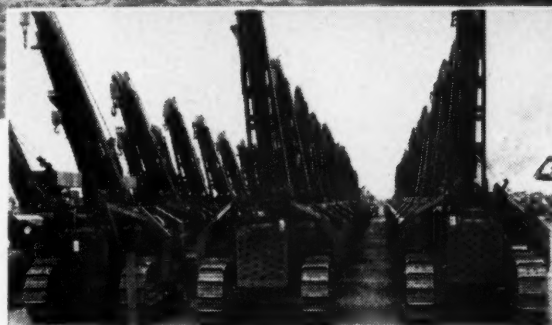
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The Navy's Seabees are making history with these big crawlers. Wherever these TracTracTors go, manned by Seabees who are skilled in every phase of construction and earthmoving know-how, they are helping speed Victory. Their record is a record of American valor, American planning, American production.

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These tractors and engines are sold and serviced by a nation-wide International Industrial Power Distributor organization.



INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

There Tomorrow

Airfield runways are completed in a hurry with equipment like this. International Diesel TracTracTor, with sheep-foot roller, working for the Seabees in the South Pacific.—Official U. S. Navy Photo.

**INTERNATIONAL
INDUSTRIAL POWER**



How Rains, Cold Weather, Poor Soil Conditions Were Licked at Gustavus

Grading, draining and paving methods which successfully solved unusually tough problems encountered in building an isolated airport in Alaska's rain belt

EARLY RECONNAISSANCE

Followed by preliminary location surveys, presented physical features and problems were overcome during the construction and paving of the Gustavus Airport built by the Messersmith Company, Inc., for the Civil Aeronautics Administration at west of Juneau in southeastern Alaska.

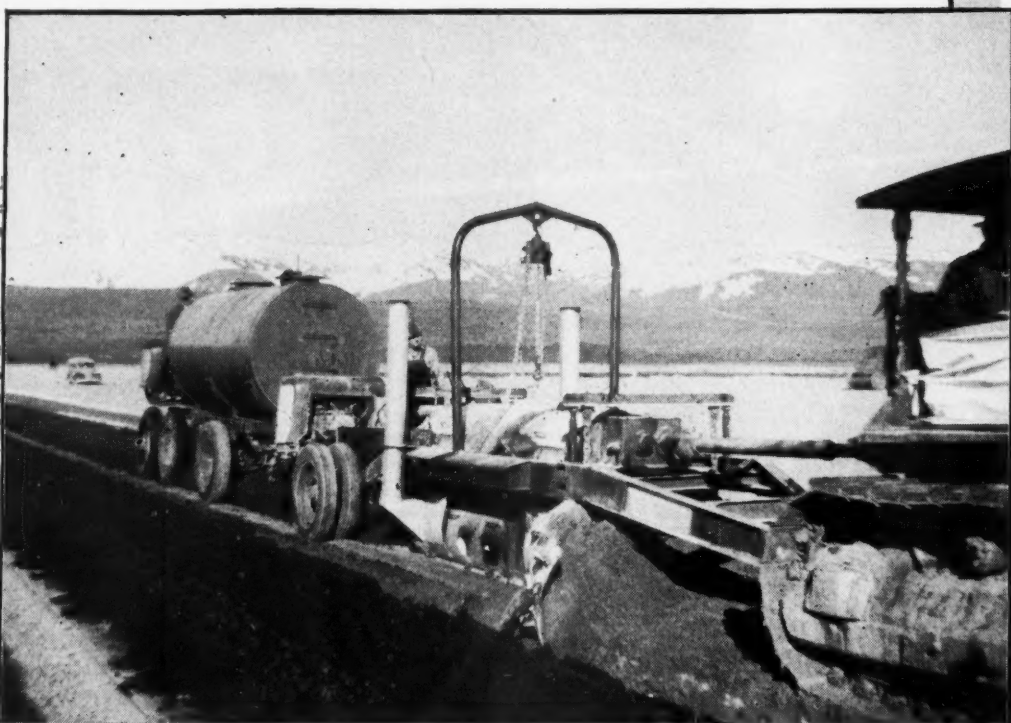
Gustavus Airport, one of the largest in the world, being used by the Army Air Force, is situated on a broad flat land which forms the head of a portion of the coast, separated from the main land by the Alexander Archipelago to the east, from the Range by Glacier Bay to the west, and from Alexander Archipelago Strait to the south.

This airport cost \$1,853,711 for radio and its being taken over by the Army Air Force. Two runways were built: a north-south runway and an east-west runway. The prime contract called for an emulsion plant, a laboratory, for paving operations, and the services of an engineer in the manufacture and use of the equipment.

One of the features proved to be the application of sand in wet weather, down to temperatures below zero. This was preceded by tests and research.

Physical features of the site were studied by engineers and constructors.

(1) The soil was a stratum of fairly



WOOD ROADMIXERS Help Whip Tough Airport Job

Gustavus Airport located 50 miles west of Juneau in southeastern Alaska was built for the Civil Aeronautics Administration and is being used by the Army Air Force.

The fact that 2 Wood Roadmixers were used on this job is proof of the ability of this pioneer traveling mixing plant to handle any paving job—anywhere.

The story of how American engineering skill and equipment whipped this tough assignment at Gustavus has been factually recorded by a CAA official. The story is complete with data and pictures and should be of unusual interest to every designer, engineer and contractor. We will be glad to send you as many copies as you wish. Write today.

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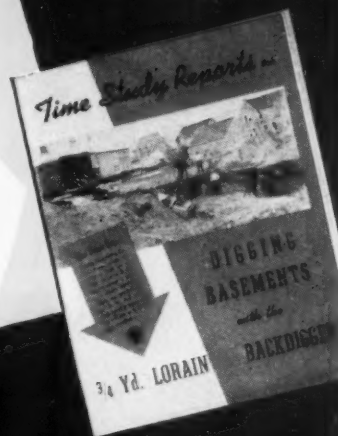
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The $\frac{3}{4}$ yd. Lorain backdigger digs a trench around the sides of the basement and scoops out the center as it goes... The machine always works on top, eliminating digging and backfilling ramps... It cuts vertical walls evenly and straight... Levels and grades the floor... Digs the corners squarely and neatly... One man can handle easily the little trimming remaining... All dirt is transferred to spoil banks for future grading or loaded directly into trucks... And, just to make the job complete, the Lorain backdigger digs the sewer and water trenches with straight sides and level bottom.

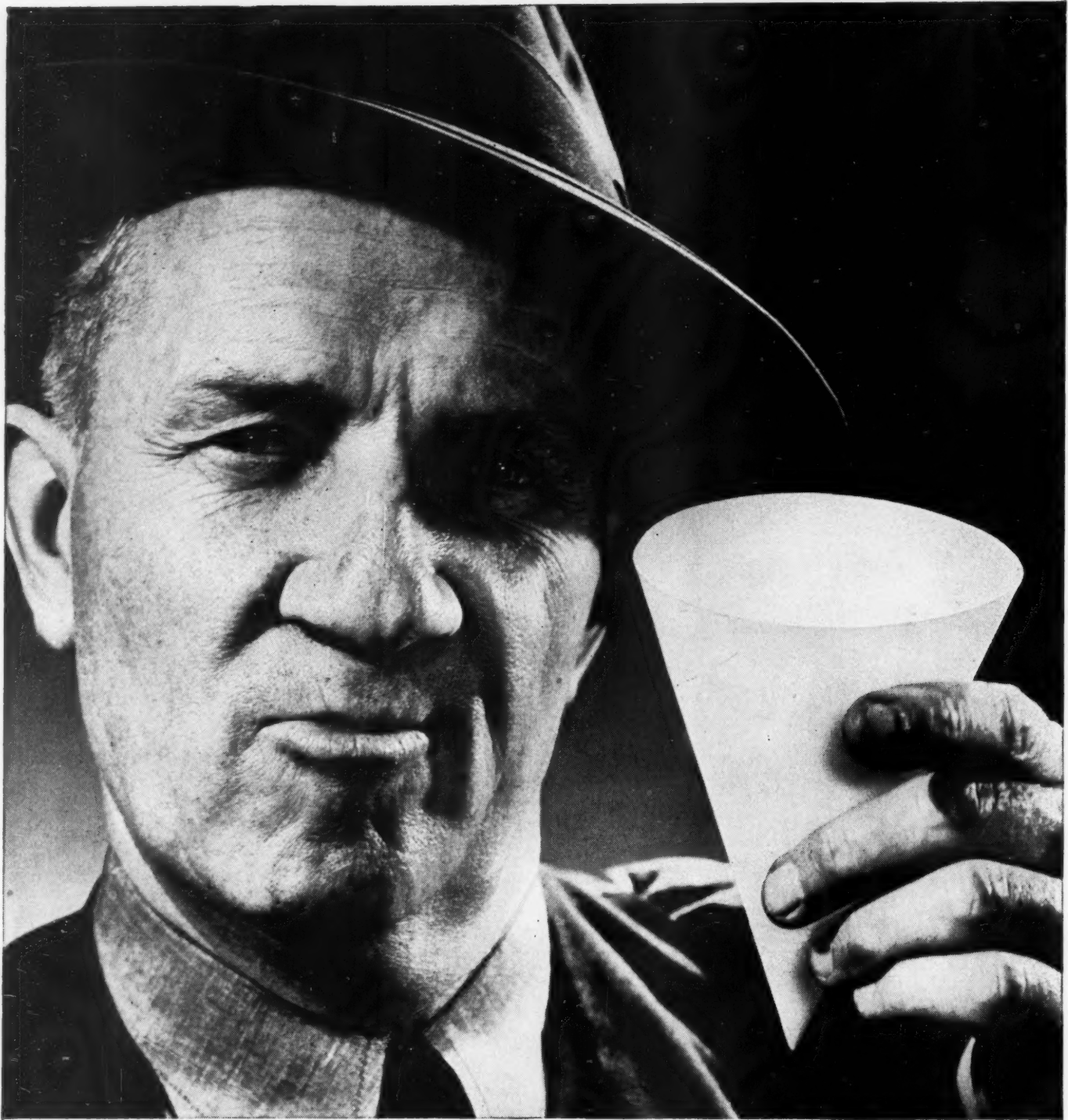
To learn how the Lorain backdigger digs basements in 2 to 3 hours—how to set it up for such jobs—send for this catalog containing complete "in-the-field" time study reports on several typical operations.



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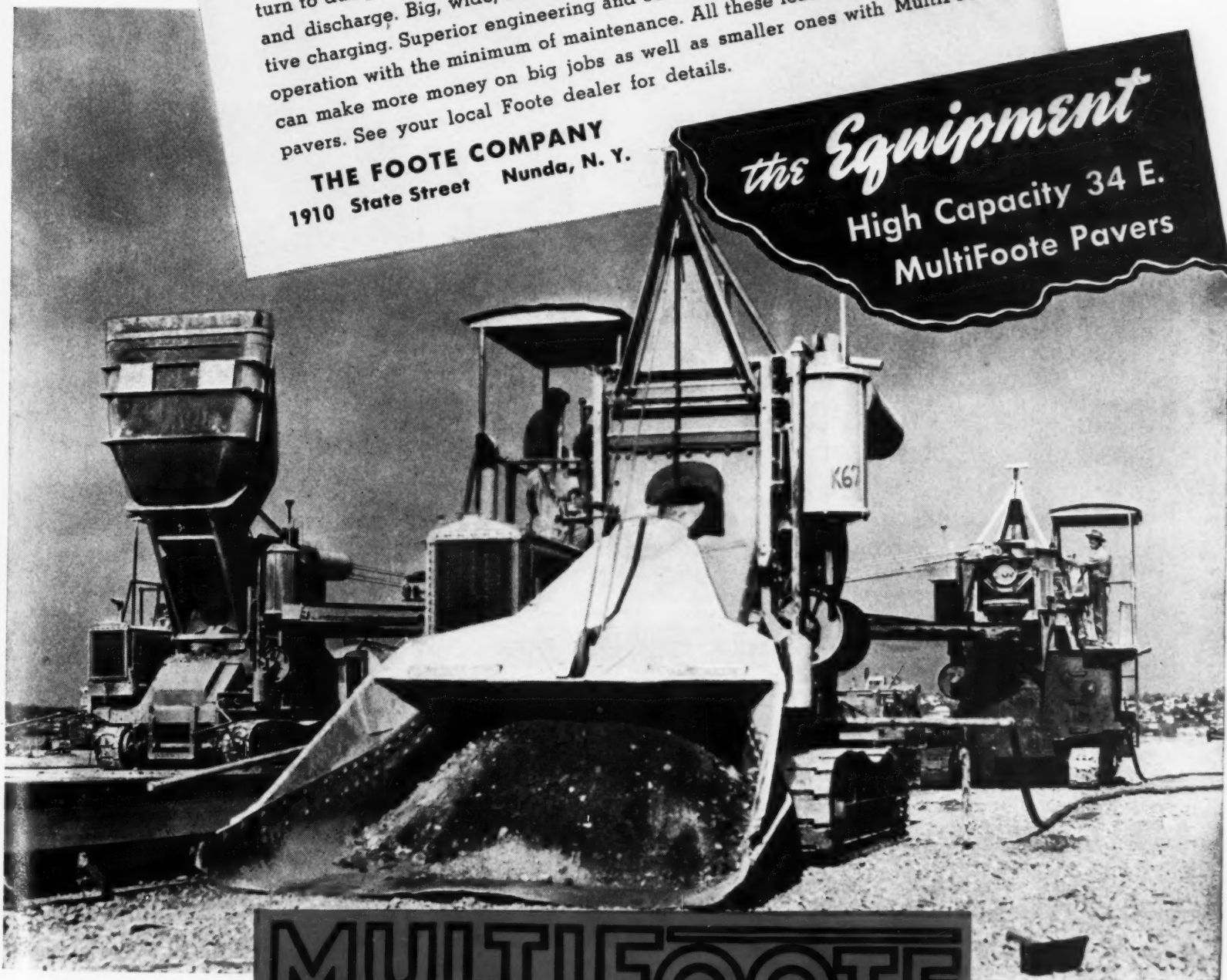
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A T2 tight-excavating in small basement at Cheyenne, Wyoming



TRAXCAVATOR fine-grading between forms on Indiana road job



Loading trucks at Vallejo, California, housing project with a T2



DIGS

GRADES

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a tire is
*mileage***



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His jobs are among the largest in the country. He can go anywhere. Tackle any size contract. And always beat or come close to his monthly yardage estimate . . . because—

He knows he has the right equipment. Knows what it can do. Knows that well-balanced variety enables him to *zone* his equipment for both long and short hauls—for shrewdly planned operation that means *lowest costs on earth*. He knows, too, that there's quick, sure, efficient mechanical and replacement-parts service always near at hand to keep all his machines in tip-top working condition.

In other words, the Dutcher Construction Corporation has reduced contracting guesswork and uncertainties to a minimum by **STANDARDIZING** on rugged, dependable, versatile and economical "Caterpillar" Diesel equipment all along the line. "In fact," writes Mr. Dutcher, "we have been 100%

standardized on 'Caterpillar' equipment since before it was even known as such, prior to 1925."

"A great many of our jobs," continues Mr. Dutcher, "have run 24 hours a day, 7 days a week; and with the 'Caterpillar' equipment, there has been surprisingly little down time for repairs. In the few cases where we had to rent additional equipment of other makes, our operating cost records have shown that its upkeep greatly exceeded that of our own."

In dozens of big ways and hundreds of smaller ones, *it pays to STANDARDIZE on "Caterpillar" Diesel equipment.*

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• The Dutcher Construction Corporation owns and operates 34 pieces of "Caterpillar" equipment — composed of D8 and D7 track-type Tractors, DW10 Wheel Tractors, Motor Graders, Elevating Graders, and Diesel Electric Sets. "Caterpillar" Diesel Engines also power the cranes they use.

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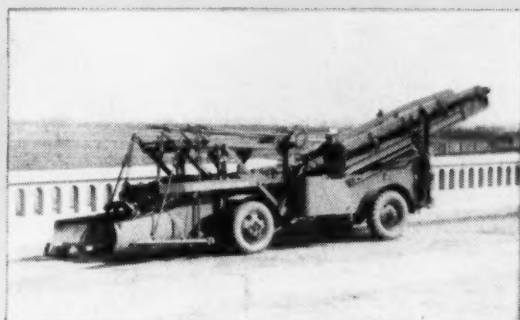
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*The discharged veteran wears this emblem.
Remember his service and honor him.*

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FORCE-FEED LOADERS

DEPENDABLE LOADING AND HAULING EQUIPMENT



FORCE-FEED LOADERS

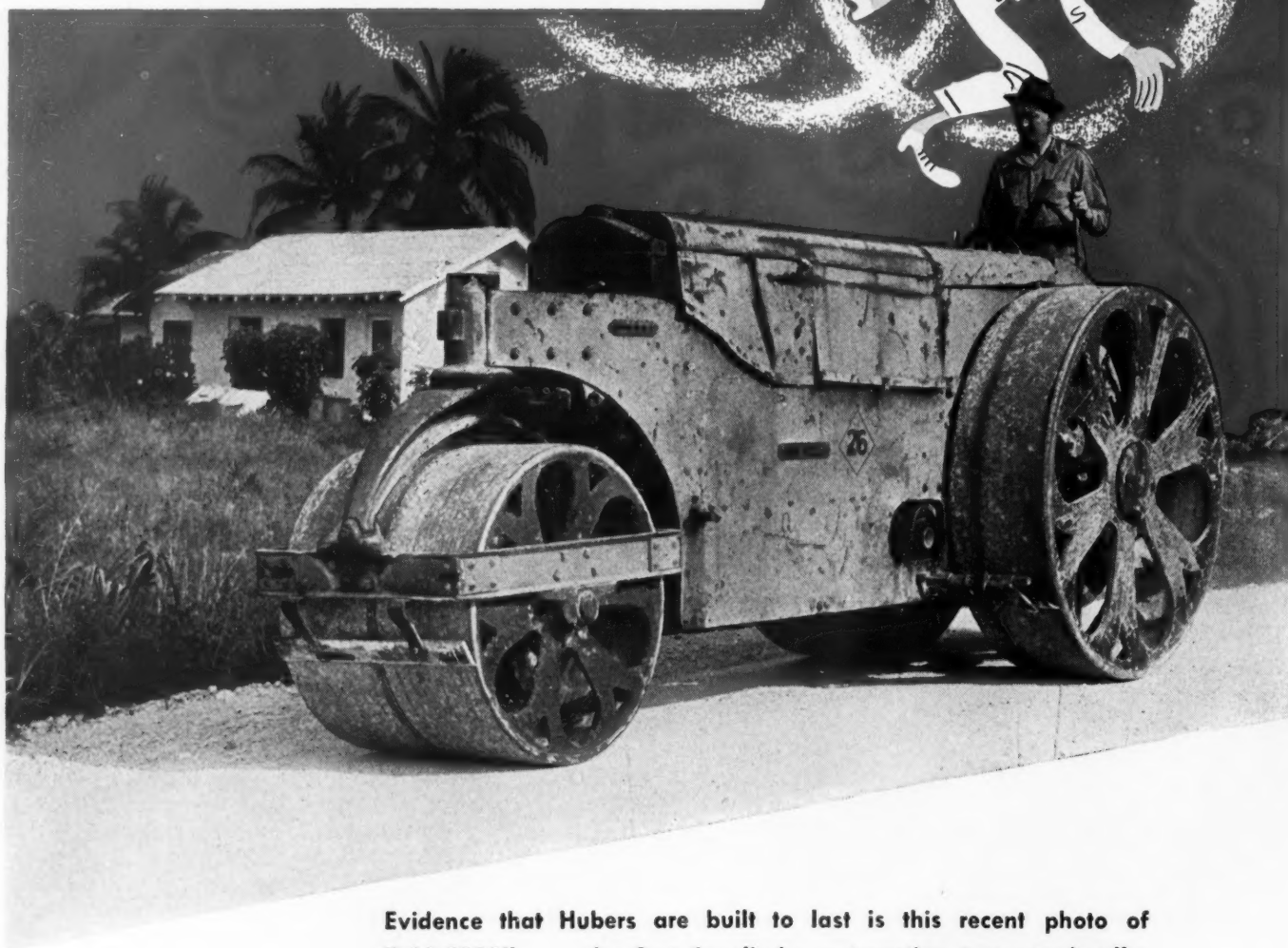


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But far transcending all these in importance are the many vital war-front jobs on which McKiernan-Terry Hammers have been engaged. Wherever ports or bridges have been built or repaired, and on many other front-line tasks such as building air fields, dams, and advanced base sections . . . usually under fire . . . these speedy, sturdy machines have justified their selection by the War and Navy Departments.

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PORUS-KROME has thousands of tiny pores or channels in its surface . . . so tiny you can't see them with the naked eye. They act as reservoirs, holding lubricating oil and feeding it back to the surface as needed. Not only does PORUS-KROME make cylinder walls last longer, but it also multiplies the life of the conventional rings 3 to 5 times.

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PORUS - KROME



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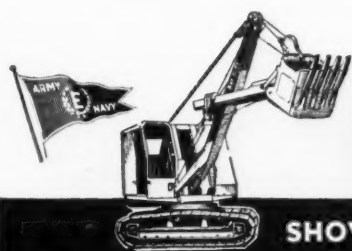
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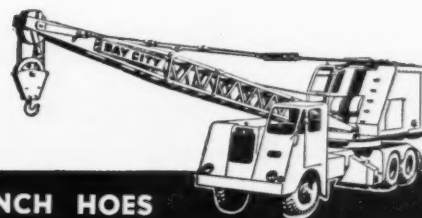
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All Macwhyte PREformed Wire Rope Is Internally Lubricated! Macwhyte Wire Rope Lubricant is packed around each wire in all strands. This improves the sliding action of the wires as they move in bending around sheaves and drums. It also protects against inside corrosion.

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Today a large percentage of Macwhyte PREformed Wire Rope is serving on the battlefields, in the air, on the sea and in essential industry. For this reason there is not enough to fill all requirements.

But don't stop asking for Macwhyte PREformed! Quite often it is available, and when it is, you get a rope with less internal fatigue, less friction, better balance and longer life. You get a safer, easier-to-use rope, because strands are PREformed to lie naturally in place.

The wire that goes into Macwhyte PREformed is processed under constant metallurgical control to make it tougher, more flexible. And when this wire is assembled into strands, PREformed and internally lubricated under close supervision of wire rope craftsmen, it just has to be the correct rope for your equipment.

We hope, as many of our friends do, that it will not be too long before we can say, "You can have all you need." In the meantime keep asking . . . not for just "wire rope," but for "Macwhyte PREformed Wire Rope." When it is available you'll have the finest!



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MACWHYTE Special Traction Elevator Rope

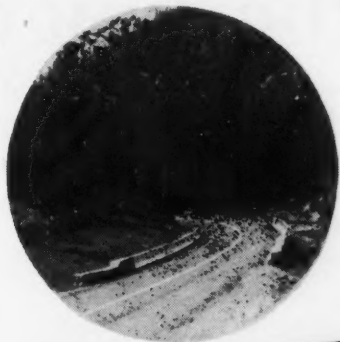
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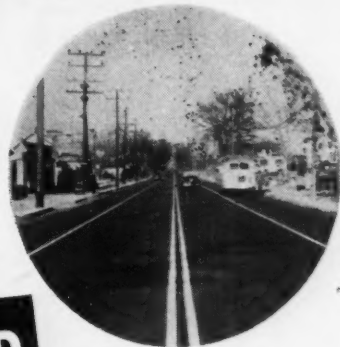
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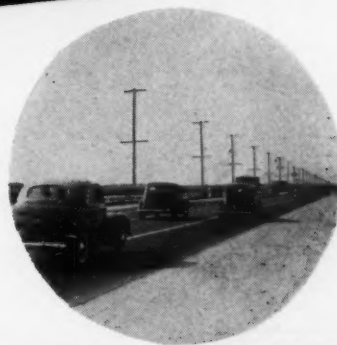


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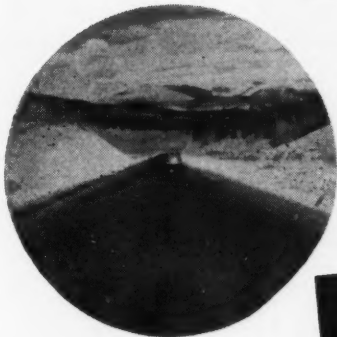


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You have that assurance, when you use Texaco Asphalt products. From Maine to Texas, from Virginia to the Rockies, road builders use Texaco for new construction and maintenance under every variety of climatic and traffic conditions.

There is a Texaco Asphalt Cement, Texaco Rapid-curing, Medium-curing or Slow-curing Surfacing Material, or a Texaco Emulsified Asphalt exactly suited to the requirements of your street, highway or airport project. A Texaco Engineer, who is an Asphalt specialist, will be glad to discuss your paving or maintenance problem with you and offer his recommendations. Write our nearest office.

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Don't Save at the Spigot and Lose at the Bung



...this advice applies to blasting, too

Many a blaster has tried to "save at the spigot" by cutting down on explosives. He loses sight of the fact that poor breakage means really high costs—low shovel output, excessive wear and tear on equipment, uneconomical use of labor—because blasting affects the whole cycle of the operation.

Good blasting, which depends on the use of the right explosive in the right way, means full shovel loads. It helps hauling costs and crusher production. It cuts down delays, idle manhours, and the need for secondary blasting.

For such *real thrift*, make use of the knowledge of the Atlas Representative. He can often produce real operating economies.



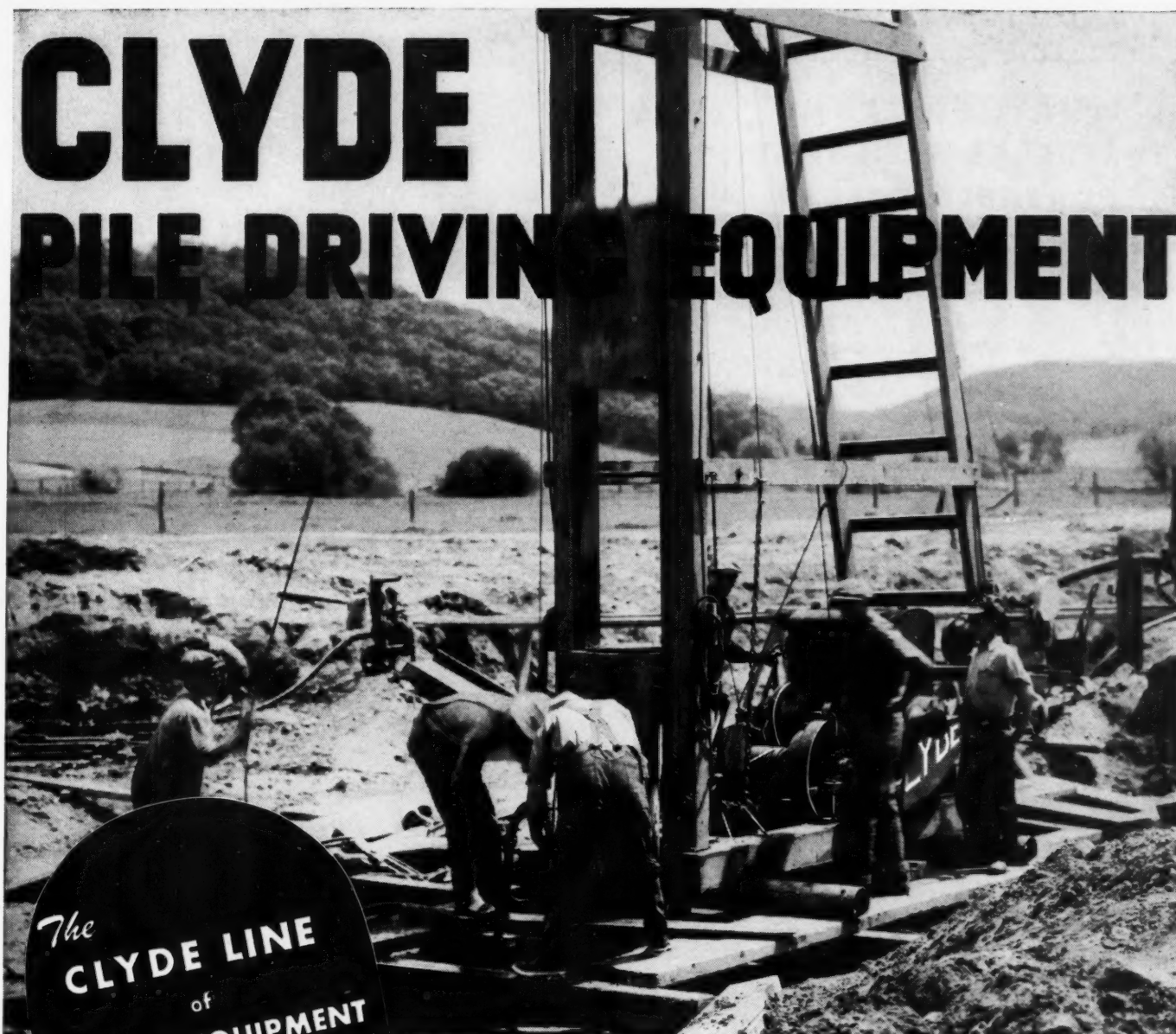
ATLAS

EXPLOSIVES
"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

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CLYDE IRON
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WORKS, INC.
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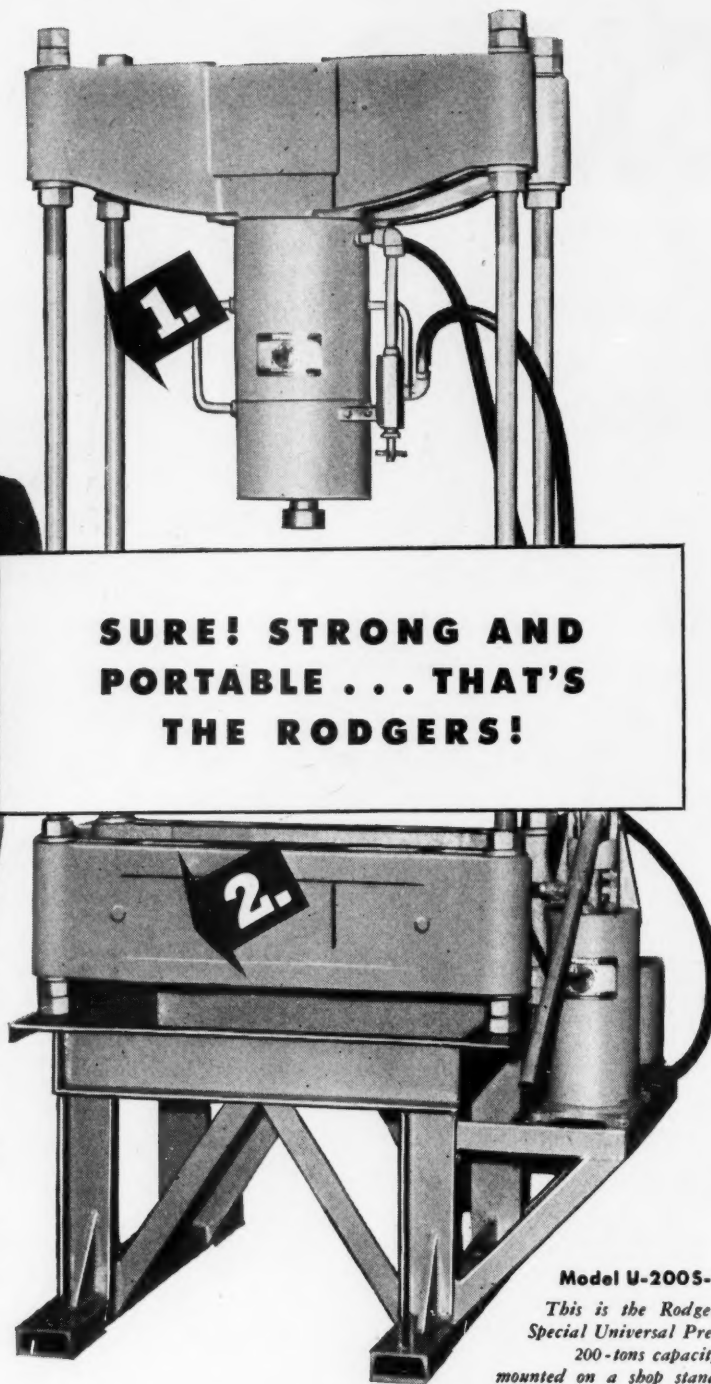
Clyde offers a complete line of heavy duty, dependable equipment for pile driving duty . . . gasoline, steam or electric hoists, leads, hammers and followers. Portable, self-contained units for fast and economical service are also available.

Whatever your construction material handling problems are, there are Clyde quality machines to save time and money for you. Write for bulletins on any type of equipment. Consult our staff of expert engineers . . . they specialize in serving you.

**WHAT! 200 TONS
PRESSURE WITH THAT
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**SURE! STRONG AND
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Model U-200S-8

*This is the Rodgers
Special Universal Press
200-ton capacity,
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THE RODGERS UNIVERSAL PRESS, like the airplane, is designed for heavy-duty operation, without being cumbersome. It's portable — saves time and labor because you can take it right to your pressing, pulling, or lifting job. 4 models — 50, 100, 150, 200 tons capacity. For complete information, write or wire Rodgers Hydraulic, Inc., 7403 Walker St., St. Louis Park, Minneapolis 16, Minn.

Uses for **RODGERS UNIVERSAL HYDRAULIC PRESS**

Pulling Gears, Sprockets, Pulleys, Couplings, Sheaves, Drums • Wheel Press Work
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1. For example, the frame rods are heat-treated alloy steel, 3 times as strong as ordinary steel rods of the same size.

2. We also use heat-treated alloy steel for the frame head and base, which have the capacity of iron castings 4 times their weight.

RODGERS HYDRAULIC Inc.



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**Good
Drainage**
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Good drainage stretches your airport calendar—keeps landing facilities open to “pay traffic” the year round. Well-designed storm drains promptly remove surface water after a storm. Properly designed subdrains remove ground water which is the chief enemy of pavement foundations. A pavement is no better than its foundation.

Strength Where It's Vital

You'll find ARMCO Pipe excellent for this vital job when you plan or design a post-war landing field. This widely used metal pipe has proved its ability to resist crushing, cracking or disjuncting under the impact and weight of heavy loads. It insures freedom from failure . . . lower airport maintenance . . . safer all-weather operation.

Long Lengths Save Time

Long lengths of ARMCO Pipe, tightly joined with sturdy band couplers, are easily and quickly installed by unskilled workmen. Shifting soils and severe frost action are no hazards.

Ask your local ARMCO man or write us direct regarding specific drainage problems. Armco drainage Products Assn., 15 Curtis St., Middletown, O.

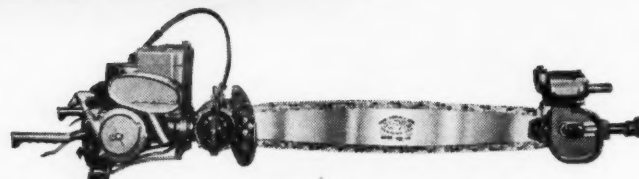


Long lengths of ARMCO Perforated Pipe joined with sturdy band couplers are easy to install and form a sturdy, flexible drainage system for a landing field.



ARMCO PERFORATED PIPE

DISSTON CHAIN SAWS ENABLE ONE CREW TO EQUAL THE WORK OF TWENTY MEN



DISSTON CHAIN SAW with Mercury Gasoline Engine
Model G-26—6 H.P. 24" capacity. Model G-36—6 H.P. 36" capacity



DISSTON CHAIN SAW—Pneumatic
Model P-27—3½ H.P.; 90 cu. ft. at 90 lbs. pressure, 24" capacity

Wherever there are timbers to cut, work can be speeded up and costs reduced by using Disston Chain Saws—one of the most important developments in saws in years. This is being demonstrated on construction jobs of many kinds, where they are cutting heavy timbers at the rate of an inch a second, and helping materially

in solving the manpower shortage problem.

There are two types of Disston Chain Saws: with Mercury Gasoline Engine; and with pneumatic drive. The one is self-contained, and can be taken wherever a man can walk; the other requires a compressor but has the added advantage of being able to operate under water.

Disston Chain Saws are of extra sturdy construction. They are light in weight, easy to operate, and require no previous experience. They are designed for both horizontal and vertical cutting, and can be used successfully on woods of all degrees of hardness.

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Write for your copy today. Find out for yourself how you can transport, elevate and place concrete in *one operation* . . . faster, more efficiently, at less cost . . . by *pumping* through pipe line.

You'll find page upon page of important questions and answers . . . pages of actual applications and results . . . mechanical data and general construction information . . . all accurately and carefully compiled to

give you the most complete information possible on PUMPCRETE . . . the pump that *pumps concrete*. It's the newer and better method for *all* types of construction jobs.

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CONSTRUCTION MACHINERY



PUMPS



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PUMPCRETES



MOTO-MIXERS



MIXERS

* Williams Brothers Corp., Tulsa, Oklahoma, has recently completed for the Louisville Gas & Electric Company the construction of 58 miles of 8 inch natural gas pipe line and 7 miles of 12 inch line. With the help of Gulf quality lubricants and fuels, the project was finished well ahead of schedule.



"Gulf Quality Products and Fine Service

**helped us finish this pipe-line job
well ahead of schedule"——**

says Superintendent G. S. Connors

IT required top-notch performance from equipment to finish this big pipe-line project well ahead of schedule! That's why job Superintendent G. S. Connors of Williams Brothers Corp.* gives a sizable share of the credit for their fast progress to Gulf lubricants, fuels, and prompt delivery service.

Like so many other leading contractors, Williams Brothers Corp. has found that Gulf lubricants provide a higher degree of protection to

equipment when it is pushed to the limit—and that Gulf fuels contribute to maximum power and efficiency. Result: fewer delays, lower maintenance costs, better all-round equipment performance, and a speedier, more profitable job!

Write, wire, or phone your nearest Gulf office now and arrange to use Gulf quality lubricants and fuels on your next job. They are quickly available to you through 1200 warehouses located in 30 states from Maine to New Mexico.

Gulf Oil Corporation
Gulf Building



Gulf Refining Company
Pittsburgh 30, Pa.

*First Machine on the Job ---
Last to Leave*

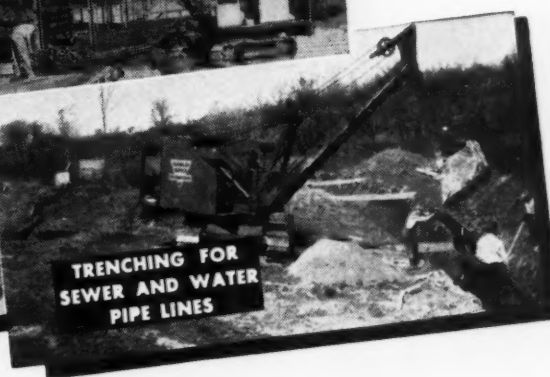
LINK-BELT SPEEDER "SHOVEL-CRANE"



*One Machine
Handles*

SIX OPERATIONS

The Link-Belt Speeder shovel-crane is the most useful machine on the construction job. . . . Convertability makes it the most profitable machine, because one machine can handle six different operations, and can be busy continuously. The "Shovel-Crane" is the first machine to come on the job, and the last to leave!



For Prompt, Efficient, Convenient Sales and Service, there is a Link-Belt Speeder Distributor Located Near You.

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)



On your power graders and road maintainers, time saved on the job is money saved in your pocket. That's why it pays to put Goodyear Sure-Grips on all drive wheels — their greater traction gets jobs done faster, saves time and money.

It's easy to see why Goodyear Sure-Grips give you more traction. Their time-proved *open center* tread is truly self-cleaning — doesn't pack up with dirt and stones. Open center design permits each husky lug to take a deeper, cleaner bite, insuring greater pull, less slip and spin, more go-ahead traction.

And underneath this great tread you get plies and breakers of Goodyear's low stretch patented Supertwist Cord. That gives these great tires extra

MORE GRIP-
to get more
work done
FASTER!

strength to withstand hard knocks and bruising wear, insures longer tire life.

But best proof of all is the fact: *more tons are hauled on Goodyear truck tires than on any other kind!* Try Sure-Grips and you'll know why.

Sure-Grip, Supertwist—T.M.'s The Goodyear Tire & Rubber Company

THE GREATEST NAME IN RUBBER
GOODYEAR

KEEP BUYING WAR BONDS—FOR KEEPS

Construction Methods

ROBERT K. TOMLIN, Editor

Volume 27

JULY, 1945

Number 7

Gun Carriages REPLACE DEMOLISHED ARCHES OF FRENCH BRIDGE

YANKEE INGENUITY came to the fore when two arches of Pont de l'Arc Bridge over the Arc River, near Aix, France, were destroyed by German demolitions. Quick repair of this important rail link to the ports of Marseille, Toulon and other coastal towns, was imperative. Plans which called for three weeks of work and a Bailey Bridge were discarded as taking too much time.

In scouting around for a solution to their problem, the men of the 343rd Engineer Regiment discovered a captured German railroad gun with carriages capable of replacing the demolished arches. The heavy gun was disassembled, the two carriages welded end-to-end and pulled into position as shown in the accompanying photograph. Structural steel beams were used as bracing for the intermediate pier.



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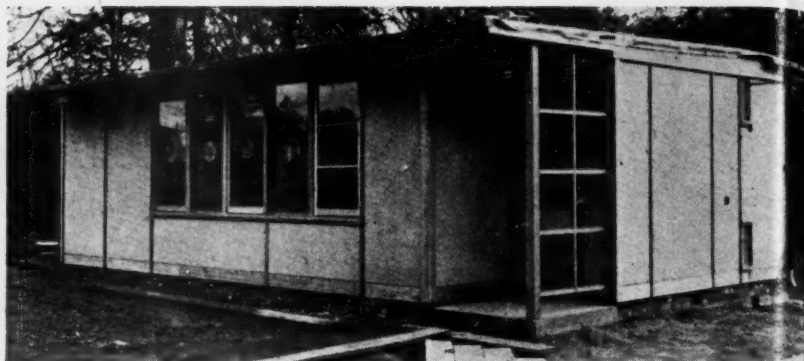


BAILEY BRIDGE OVER RHINE, built by Canadian Army Engineers, is opened to traffic. Small sign in foreground specifies 40-ft. distance between vehicles to prevent overloading any portion of structure.

British Combine Photo

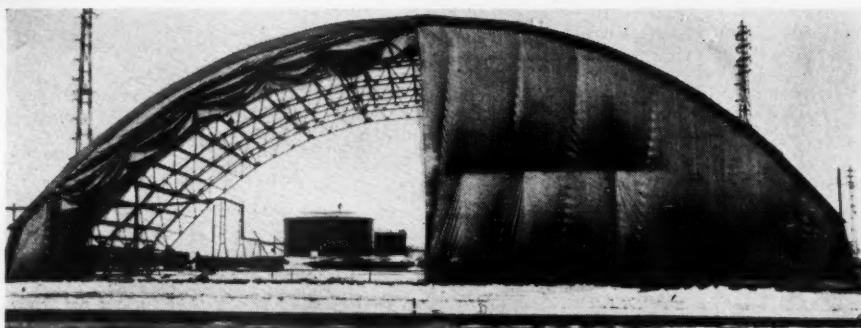
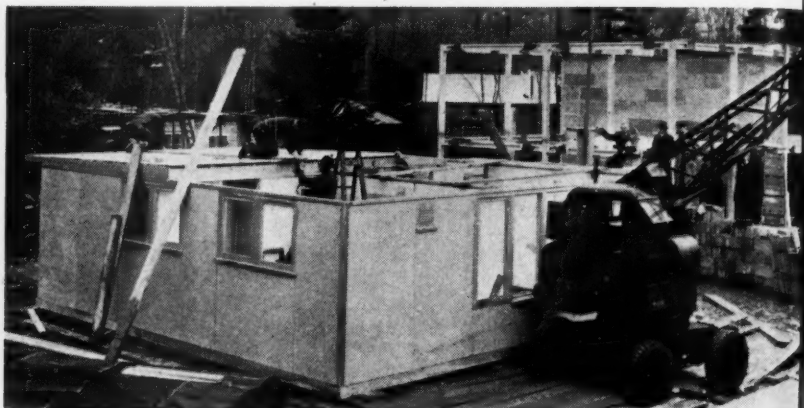
MULTI-STORY WAREHOUSE on pile-supported concrete piers (below) is built at U.S. Naval Air Station, San Pedro, Calif. Building is being constructed for Bureau of Yards and Docks by James I. Barnes Construction Co., of Santa Monica, for \$1,420,000.

U.S. Navy Photo



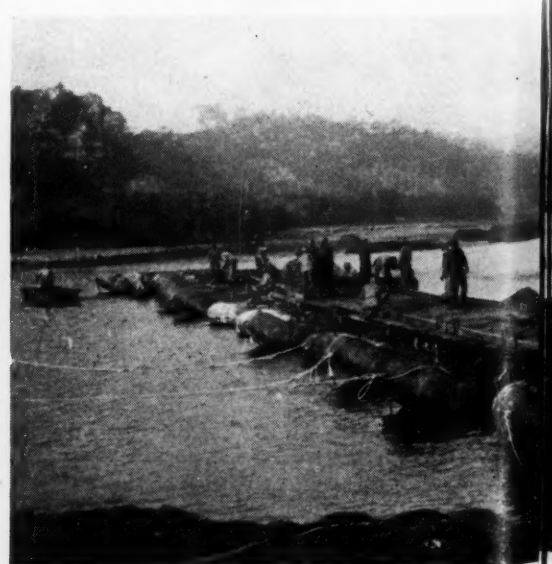
FIRST AMERICAN HOUSE in Britain is erected at experimental station. To relieve housing shortage, 30,000 temporary homes of prefabricated type are being provided by United States. Panelized construction expedites shipping and assembly. In photo below roof panels are shown being put on and bolted.

British Official Photo

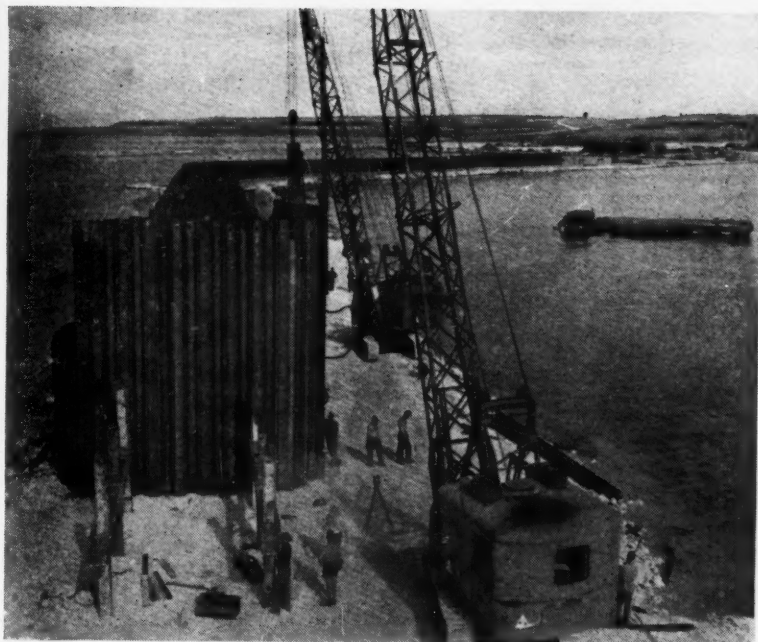


GLASS CLOTH is used by U.S. Army Engineers for curtains, side walls and ends of airplane hangars at advance Army Air Forces bases. Structural steel framework and glass cloth are shipped to advance bases for assembling. Cloth woven of glass fiber yarns and coated with synthetic rubber or resin is supplied by Owens-Corning Fiberglas Corp.

ENGI
bridg
heavy
troops



THIS MONTH'S NEWS REEL



BREAKWATER CAUSEWAY is constructed of interlocking steel sheet-pile cylinders by Seabees in Pacific area. Here Northwest cranes set piles and handle hammer.

U.S. Navy Photo



EXCAVATION FOR ANDERSON RANCH DAM on Boise River in southwestern Idaho is 88 percent completed. Construction schedule calls for placement of 2,000,000 cu. yd. of embankment this year, with completion of dam scheduled for winter of 1947-48. Spillway will be open-channel, concrete-lined chute with maximum discharge capacity of 20,000 cu. ft. per second. U.S. Bureau of Reclamation structure will be highest earthfill dam in world.

U.S. Bureau of Reclamation Photo

GERMAN SUPERHIGHWAY (below) carries American trucks in U. S. First Army sector near Aqidienberg, Germany.

Signal Corps Photo

ENGINEERS ON OKINAWA (below) build ponton bridge under enemy fire to carry tanks and other heavy mechanized equipment to enable infantry troops to attack Kakazu Ridge.

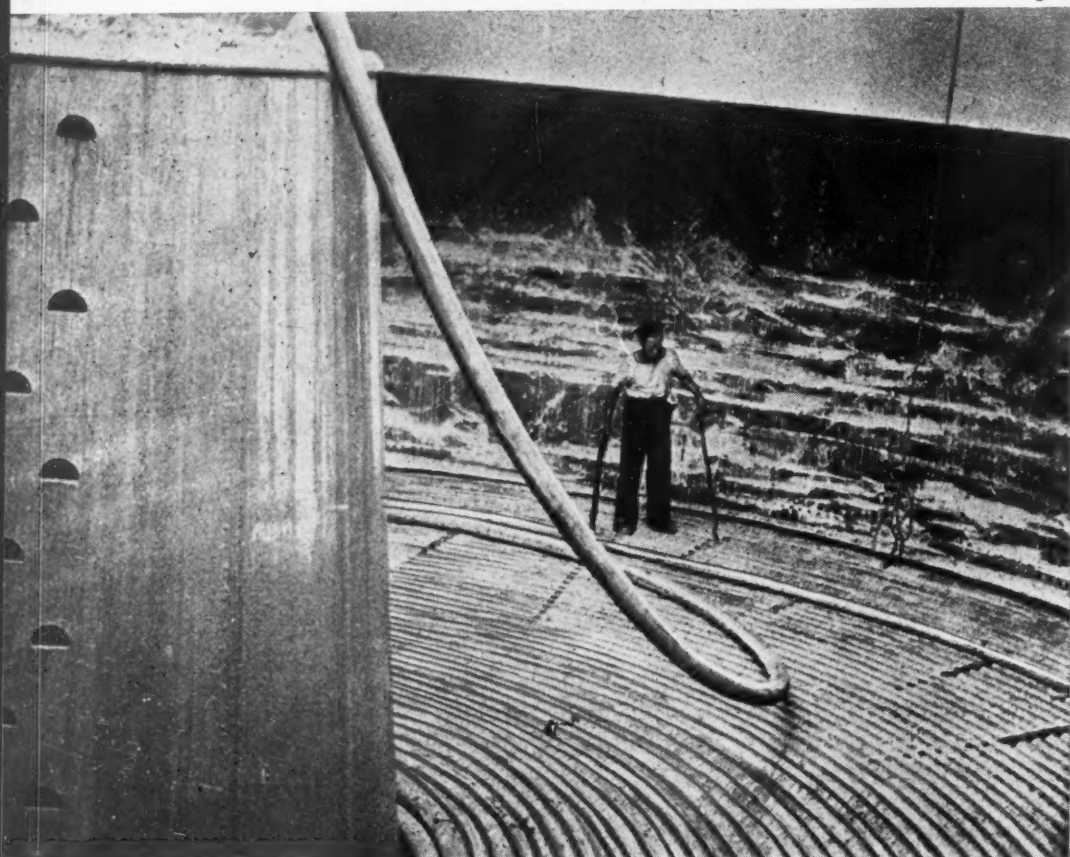
Signal Corps Photo



Continuous, Flexible Pipelines

Unreeled from England to France

Photos from
British Information Services



CONTINUOUS LENGTH of 3-in. Hais flexible metal tubing sufficient for cross-channel pipeline is coiled around vertical drum in hold of Liberty ship "Latimer."

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HAMEL PIPE (below) made up of 20-ft. sections is stored in 4,000-ft. lengths ready for winding on Conundrums. Total of 350 mi. of pipe can be stored here.



ONE OF THE MOST SPECTACULAR STORIES to come out of the European Theater of Operations is that of laying 20 3-in. pipelines under the English Channel to carry fuel supplies to allied forces on the Continent. From August 12, 1944, to May 8, 1945, about 120,000,000 gal. of gasoline reached the Anglo-American armies in Europe via the pipeline system laid under the English Channel by British engineers in cooperation with the British Navy. A million gallons daily still is reaching France by way of 20 undersea pipelines as these notes are written. Sixteen of these lines run from Dungeness, on the southeast coast of England, to Boulogne, and four from the Isle of Wight to Cherbourg. From these two French cities, fuel is carried via high-pressure gasoline lines to the Rhine.

For security purposes the vast engineering project was called "Operation Pluto," meaning "Pipeline Under the Ocean." It guaranteed uninterrupted delivery of bulk petroleum products and saved man-hours and materials by eliminating extensive harbor, dock and storage facilities otherwise needed for accommodation of tankers. Also, an undersea fuel delivery system is invulner-

PIPE

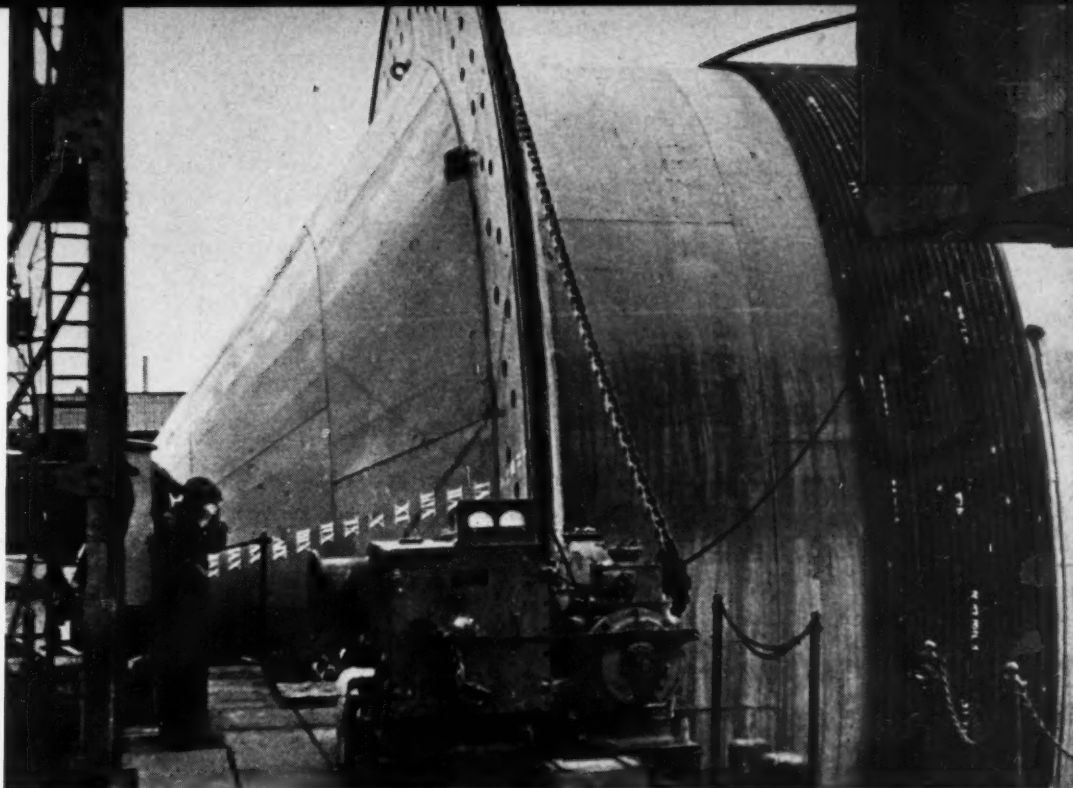
able from air, surface or submarine attack, and is completely unaffected by weather.

While the British Pluto project was under way, the United States Army was working on a similar idea. After discussions between the respective authorities, it was agreed that efforts should be concentrated on Pluto. General Eisenhower and his staff took an active interest in Pluto's development, and a unit of the U. S. Army Engineer Corps, under the direction of Colonel A. K. Easton, New York, arranged for the manufacture of 140 mi. of HAIS (Hartley-Anglo-Iranian-Siemens) pipe cable by the General Cable Co., Phelps Dodge Copper Products Corp., the General Electric Co. and the Okonite-Callender Cable Co. At the manufacturing plants, cable machines spun an armor of steel wire around 3-in. lead pipe.

Background of Project

Lord Louis Mountbatten, then head of Combined Operations, in April, 1942, asked Geoffrey Lloyd, British Minister of Petroleum Warfare, if an oil pipeline could be laid across the English Channel. The experts were doubtful, but A. C. Hartley, chief engineer of the Anglo-Iranian Oil Co., who had used 3-in. high-pressure pipelines in Persia, suggested a pipeline something like a submarine electric power cable without any core or insulation, which could be laid across the Channel in a few hours, by cable-laying ships.

By working day and night over two week-ends, technicians of the firm of Siemens and Henleys completed a full-scale order for several hundred yards of this pipeline to be laid in the Thames from a cable-ship lent by the British Post Office. The results were so successful that Prime Minister Churchill gave the scheme his blessing and two 30-mi. lengths of flexible pipe were ordered to



SECOND TYPE of undersea pipe-laying equipment uses so-called Conundrum, shown here in position for loading 3-in. steel pipe. Drum is rotated slowly as it winds continuous pipe for channel crossing. Fully loaded with 70 mi. of pipe, drum has outside diameter of 50 ft. and weighs 1,600 tons. Roman numerals on end of drum indicate draft, in feet.

British Combine Photo

an original 2-in. diameter, so that full-scale trials could be held in Bristol Channel, where currents and other conditions closely approximated those to be encountered in the English Channel. Subsequently, the pipe diameters were increased to 3 in., and the pipe wall was strengthened for working pressures in excess of 1,200 psi.

Eight months after Mr. Hartley suggested the scheme an experimental pipeline was laid in the Bristol Channel during a moderate gale, by H.M.S. Holdfast, a coaster fitted with special gear. As a result of this operation, gasoline was delivered from Swansea to Ilfracombe.

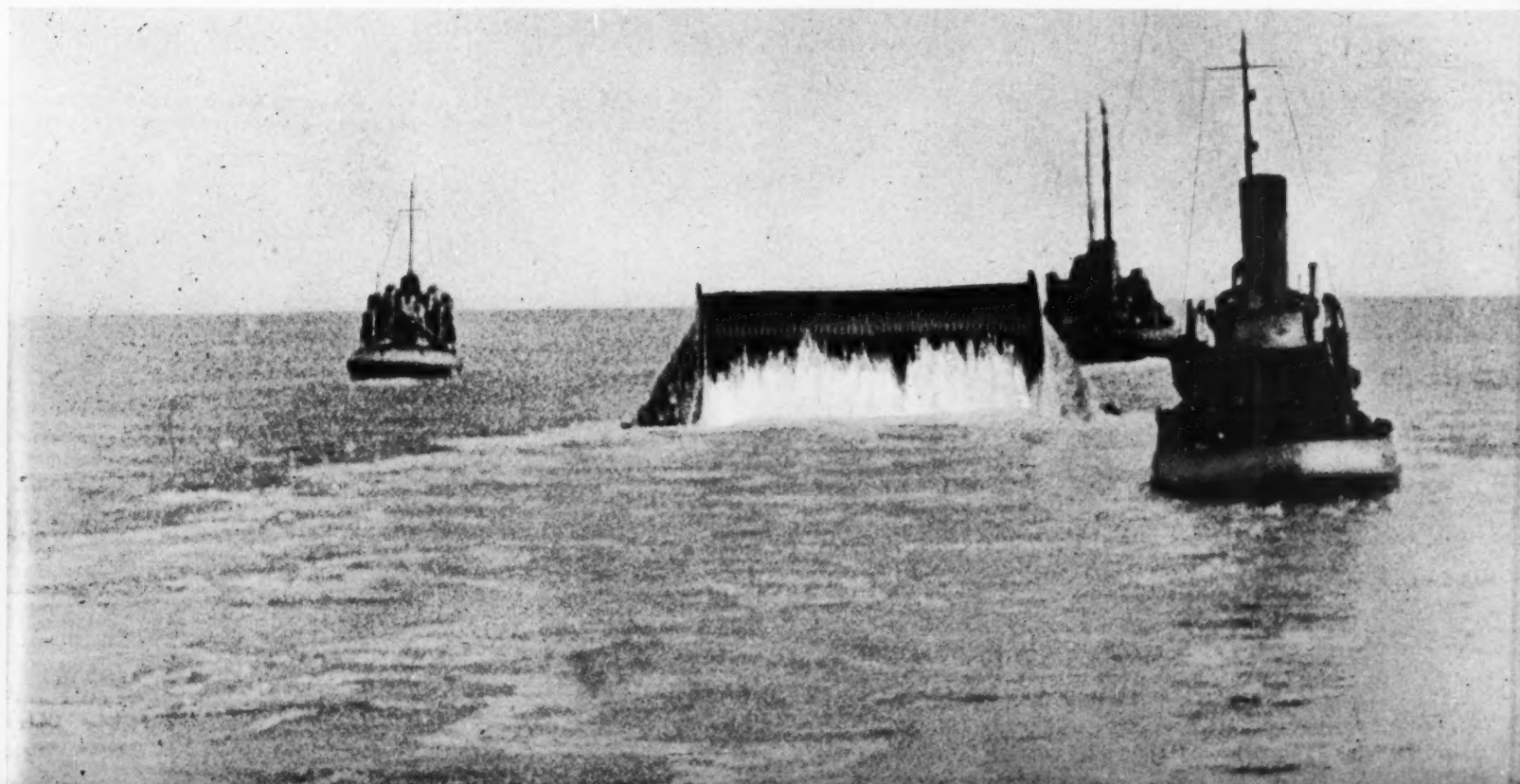
The fact that the pipe cable was hollow increased the laying difficulties, since it was liable to kink and stop the oil flow. The cable was therefore laid full of water to provide sufficient internal pressure to eliminate the tendency to kink.

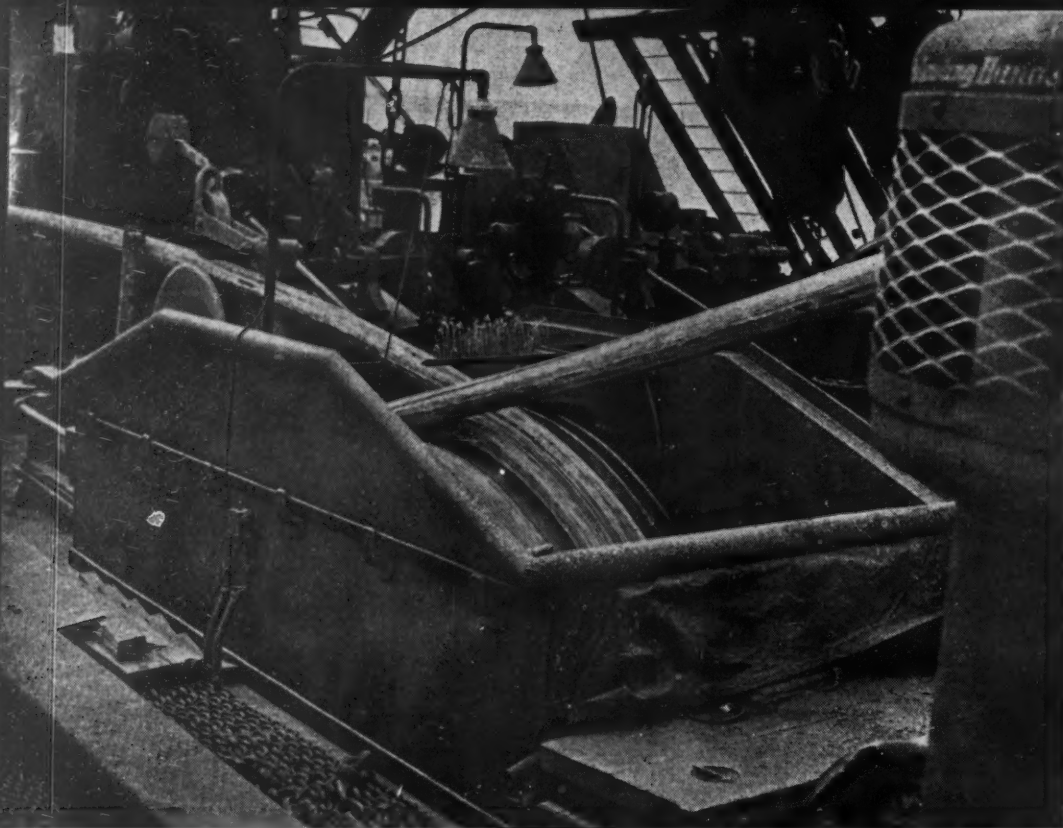
Second Type of Pipeline

Meanwhile another type of pipeline was invented by B. J. Ellis, chief oil-fields engineer of the Burma Oil Co., and H. A. Hammick, chief engineer of the Iraq Petroleum Co. This second pipeline, called "Hamel," was composed of 20-ft. lengths of 3-in. dia. steel pipe

Page 69

PIPE-LAYING DRUM (below) towed by two tugs and escorted by a third, places continuous 67-mi. length of 3-in. pipe across channel from England to France.





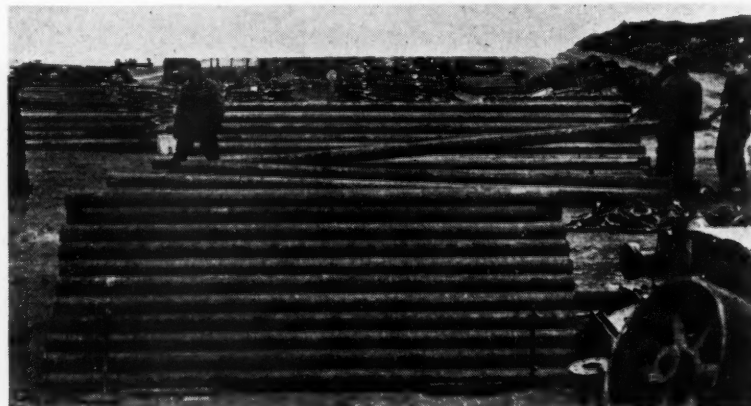
FLEXIBILITY of 3-in. HAIS pipe enables it to pass around cable drum of Liberty ship "Latimer" as pipeline is laid in English Channel.

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CAMOUFLAGED STORAGE TANKS (below) filled from channel pipelines hold reserve supplies for front-line armies.



ON EUROPEAN CONTINENT, pipe (below) for carrying fuel from cross-channel pipelines is stored and trucked forward to keep pace with Allied advance.



FIRST INVASION PIPELINE (below) at Boulogne, France, is fitted with T-union valve, Oct. 1944. Fuel from channel lines eventually reaches as far as Frankfurt-on-Main, Germany.



which could be welded automatically into any desired length and could be wound on to a drum like thread on a spool, if the drum were 30 ft. or more in diameter. To test this scheme, the Admiralty's Director of Naval Construction converted a hopper barge into a pipe-laying craft by adding a large cylinder reel, rotating in trunnions on the barge deck, and capable of carrying many miles of the 3-in. Hamel pipe and feeding it into the sea. From this a second idea was developed—a floating drum capable of carrying the full length of pipe required for the channel crossing. The drum rotated about its horizontal axis unreeling the pipe as it was towed across the Channel by two tugs.

Within a few months a special factory at Tilbury, on the Thames Estuary, was equipped for welding 20-ft. lengths of Hamel pipe into 4,000-ft. lengths at a rate of 10 mi. per day, with facilities for storing the lengths to a total of 350 mi. A duplicate factory was established as an emergency measure in case the first should be bombed.

The floating drums, called H.M.S.

(Continued on page 174)

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Tractor Dragline

Whips Wet Weather

To Build

TIMBER

ACCESS ROAD

POWER AND MANEUVERABILITY of a new type of tractor crane, rigged for the job as a $\frac{1}{2}$ -yd. dragline, made it economically practical for the Kuckenberg Construction Co., contractor, Portland, Ore., to push completion of a 5-mi. timber access road up Cape Creek on the Oregon coast in the face of heavy winter rains. Mounted on a D7 Caterpillar, the crane-dragline unit, called the Hystaway by its maker, the Hyster Co., Portland, was able to get in and out of places where conventional machines could not go. Such is the opinion expressed by Larry Kuckenberg, partner in the firm, who states that the tractor dragline never bogged down and got the work done in all kinds of weather, saving time and money for the contractor.

Tractor Mounting

Methods of attaching the 7,500-lb. dragline rig to a standard, unaltered tractor preserved full flexibility of the crawler assembly and thus contributed to the mobility of the complete unit. The crane attachment, designed for mounting on D6, D7 or D8 tractors, consists primarily of a hoist, attached to the main body of the tractor at the rear, and a boom backstayed to a mast which is pivoted at its base. The mast in turn is backstayed to the front part of the track roller frames of the tractor, through an equalizer beam and struts which have flexible connections at both ends.

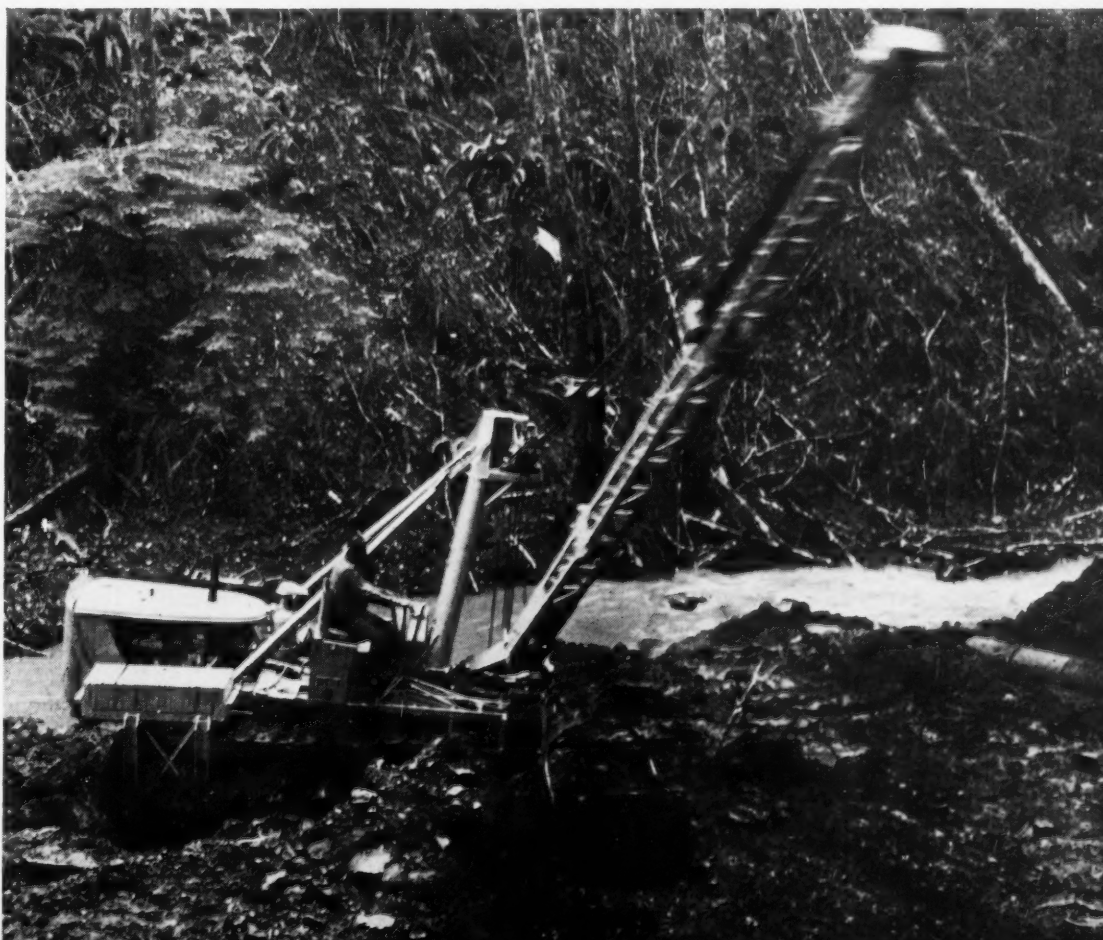
This method of attachment permits unrestricted oscillation of the crawlers of the tractor, and the tractor spring can move freely even when the crane is operating. Because the principal overturning forces are delivered to the mast and backstay structures and not to the main body of the tractor, loads applied to the boom do not cause the main body of the tractor to move up and down as permitted by the tractor spring, nor do such loads prevent the body of the tractor from moving up

(Continued on page 150)



TOUGH JOB of building timber access road through rough country in wet weather yields to power and maneuverability of tractor crane operating $\frac{1}{2}$ -yd. dragline bucket on 30-ft. revolving boom. A-frame mast, pivoted at base, is backstayed through flexible connections to front of track roller frames, preserving unrestricted flexibility of crawlers and preventing up-and-down movement of main body of tractor when loads are applied to boom.

LOW MOUNTING of hoist at rear of tractor (below) puts dragline fairlead close to ground for efficient digging to within few feet of machine. Boom can swing 120 deg. either side of center. Counterweights over tracks are not needed when tractor carries bulldozer.





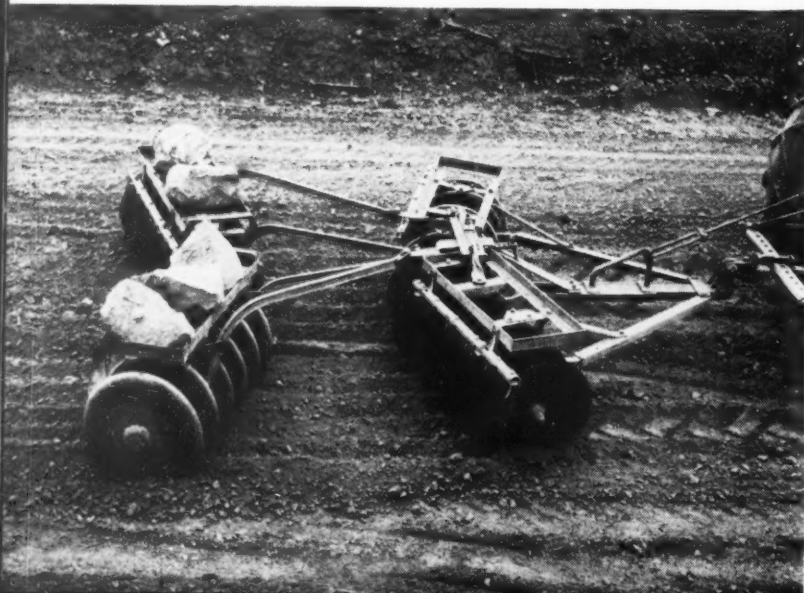
HEAVY WORK in ripping compacted shale soil road is performed by 10-ton three-wheel roller using hydraulically controlled scarifier. Studs on driving wheels give added traction. Motorized blade grader shapes loosened material for mixing and compaction.

Page 72



FOLLOWING APPLICATION of pulverized waterproofing agent by spreader in five trips totaling 6 lb. per sq.yd., tractor-drawn disk harrow continues dry-mixing of soil.

DISK HARROW (below) mixes loosened shale with powdered waterproofing agent previously applied on strip 14 ft. wide down center of 22-ft. graded road in Pennsylvania.



Powdered Admixture

Waterproofs Shale Road in PENNSYLVANIA

STABILIZATION TEST

A SIMPLE CRATER TEST performed on the site by a Hercules Powder Co. representative determined the applicability to a shale earth road near Gettysburg, Pa., of Stabinol, a powdered combination of specially treated resin and other chemicals, for the purpose of waterproofing and stabilizing the soil on this experimental project of the Pennsylvania Department of Highways. Originally planned for another earth road, soil samples from which had been thoroughly tested in the Hercules laboratory at Wilmington, Del., the experiment was switched to the shale road to permit earlier construction, ahead of freezing weather, using state maintenance equipment from an adjacent project. With the addition of a light farm tractor and disk harrow, this equipment, consisting of a roller with scarifier attachment, a motor grader and a tank wagon quickly carried out the preparation, manipulation, moistening and compacting necessary in treating the soil to 6-in. depth with 6 lb. per sq. yd. of the waterproofing, stabilizing product, applied to the loosened earth in several trips by a lime spreader attached to a truck. The roller-scarifier and tractor-harrow units followed the spreader on each trip.

In its effect upon soils, the resin-base product known as Stabinol is different from other stabilizing agents. Essentially, with any soil having the proper affinity for it, Stabinol waterproofs the soil particles and prevents the penetration of excessive moisture, thus maintaining the stability of the road

IN CHARGE OF MAINTENANCE OPERATIONS (below) for Pennsylvania Department of Highways is **WARREN MYERS** (left), maintenance engineer, here discussing project with **L. D. LAMBERT**, district maintenance engineer.



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EXPERIMENTAL PROJECT gets personal attention of these Pennsylvania Highway Department representatives (left to right): **ALLEN SHARRAH**, assistant maintenance superintendent in Adams County; **L. D. LAMBERT**, district maintenance engineer; **W. H. HERMAN**, division engineer; **R. J. HARPER**, district engineer; and **L. O. BEITLER**, foreman.



OVERSIZE CHUNKS of hard shale are removed from 14-ft. treated width by hand shovels after earth has been loosened by scarifier and disk harrow.

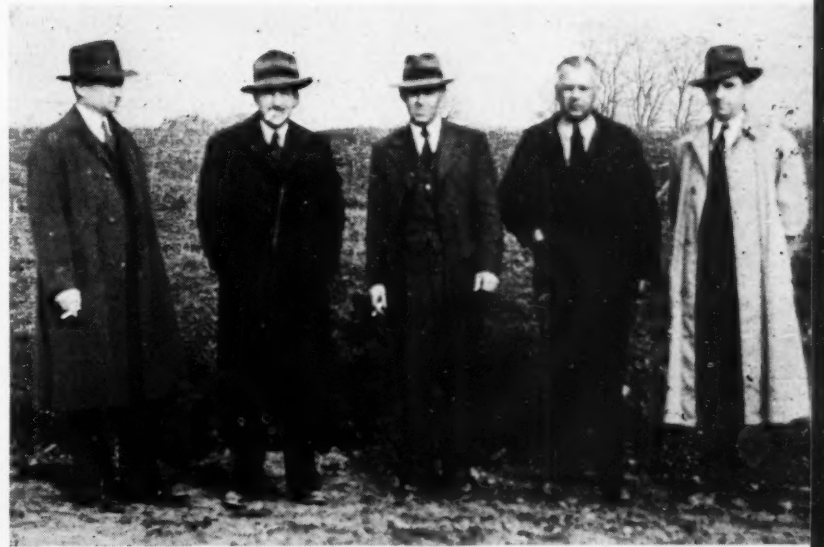
Page 73

structure in all weather. It is not effective with all soils, and laboratory or field tests are necessary to determine conclusively its applicability in each case. Ordinarily, the material works well with clayey or silty soils in which fine clays do not predominate. Conversely, the material is not recommended for granular soils (sands and gravels) having small proportions of binder.

Crater Test—Quick evidence of the feasibility of waterproofing a soil with Stabinol is provided by a field test of the kind performed beside the Pennsylvania shale road. A sample of soil is mixed with about 1 percent of the pulverized product and is formed into a cone-shaped pile with a cup-size depression, or crater, in the top. Alongside, a similar pile is formed of untreated soil. The two cupped depressions are filled with water. If the soil has the proper affinity for the waterproofing agent, the water in the cup of the treated pile will still be standing at the original level after all the water in the untreated mound has soaked into the earth and turned it into a muddy mass.

Evidence of this kind demonstrated the applicability of the product to the shale on the Pennsylvania road, the first in the state to be so treated. Successful applications of the waterproofing agent had been made for the Army and Navy on roads and airfields in several parts of the United States, and the

(Continued on page 160)



ENGINEERING SERVICE is provided by manufacturer of waterproofing agent, represented by two men in this group on project. Group includes (left to right): **EVART MAYFIELD**, Hercules Powder Co.; **L. D. LAMBERT**, district maintenance engineer; **ALLEN SHARRAH** and **R. A. THOMPSON**, assistant maintenance superintendents in Adams County; and **P. J. RENO**, Hercules Powder Co.

AFTER DRY MIXING of soil with waterproofing agent, tank wagon (below) drawn by truck sprays additional water to bring moisture content of soil nearer to optimum.

MOTOR GRADER (below) with winterized cabin, heated when desired by exhaust bypass pipe, shapes mixed material to proper cross-section profile. This is followed by 10-ton roller.



Mile-a-day DITCHING

Typifies Digging Capacity of Modern Trenching Machines

By THOMAS MORRIS
Trenching Contractor, Norfolk, Va.

OIL PIPELINE JOB moves rapidly as two machines operate in tandem to dig one trench, Buckeye Model 32 making first cut and Model 48 taking out second cut. Use of two trenchers assures steady mileage of pipeline construction; if one machine breaks down, other can dig full depth until first machine is repaired. Two machines dig up to 2 mi. a day on oil and gas lines by this method.

STEAM TRENCHING OUTFIT (below), one of first machines designed specifically for ditching purposes, is Parsons Model 60 oscillating type shown here at work in 1907. This massive assemblage of machinery is husky, awkward progenitor of modern efficient trenching machine, relatively much lighter in weight and capable of digging a mile a day. Note that steam traction and power unit of 1907 model is distinct from digging unit.

DURING THE FORTY YEARS or more since their first crude prototypes went to work, trenching machines have developed from steam outfits, pulled ahead by deadman and winch, to the present self-propelled crawler models capable of digging a mile a day. Designed strictly for the one purpose of cutting ditches, the trenching machine, when properly applied, is the fastest earthmover for its weight and horsepower in the construction field. Before a contractor can reap the benefits of this great potential output, he must first select a trenching machine of a type and size which fits the work to be done and, even more important, must put on the machine an operator who possesses both skill and mechanical know-how.

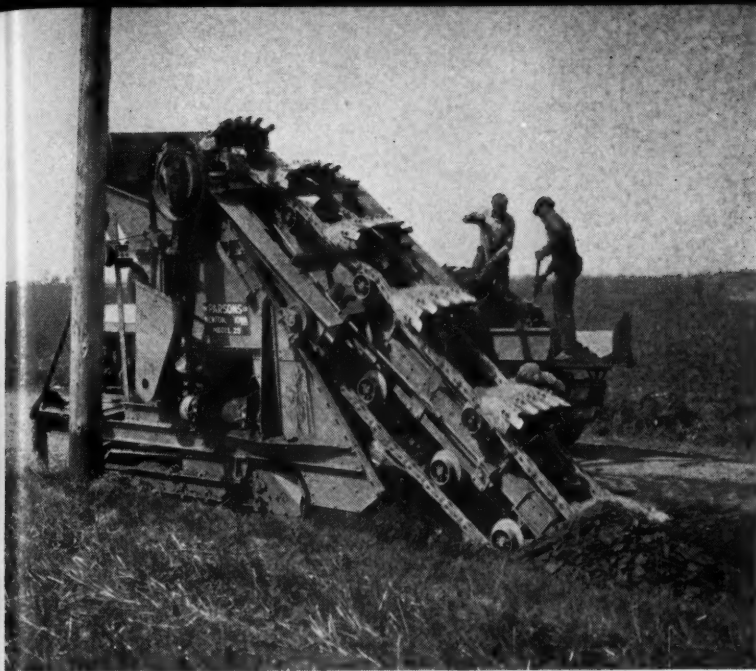
In the following paragraphs, several comments and recommendations are offered by the writer in the hope that 25 years' experience in the trenching machine field may yield some suggestions of value to newcomers in the business. The 25-year experience includes work in various capacities as oiler, maintenance man, operator and, finally, owner of a business which operates in nearly all states east of the Mississippi. Jobs undertaken during the quarter century have

OFFSET
dig with
Model 2

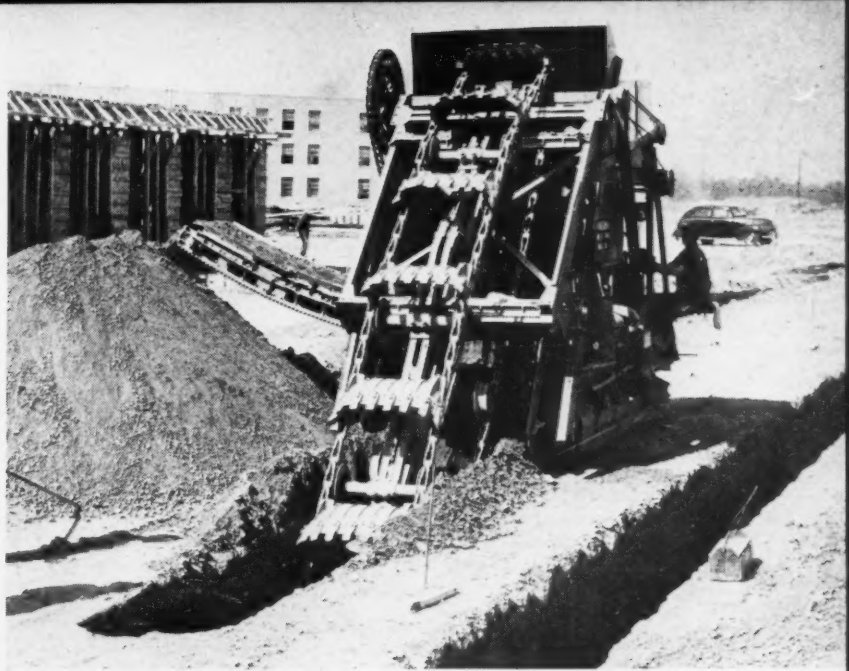
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OFFSET BOOM moved over to far left side of machine enables trencher to dig within 12 in. of pole. Conveyor loads trucks at other side of Parsons Model 25, particularly adaptable to light sewer and water trenches.



POWERFUL MACHINE for sewer and water work. Parsons Model 310, said to be largest full-crawler model in world, is equipped with offset ladder boom making machine one of best units for medium-heavy-trenching.

called for all kinds of digging, from loam to hardpan, in every type of terrain, from salt marsh to mountain country. The work has involved personal operation of practically every model of trenching machine manufactured and has led to the ownership of 36 machines of various models.

Three Types of Trenchers

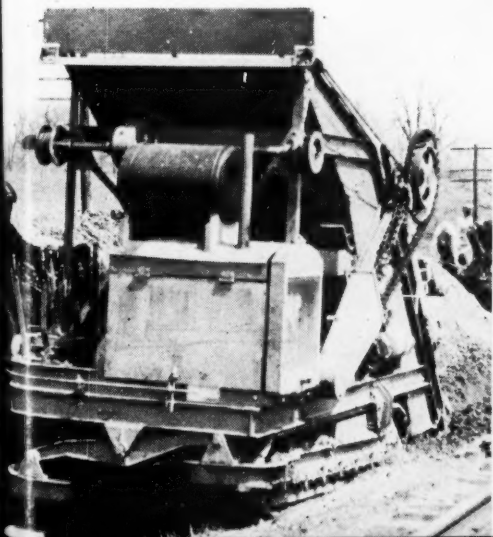
Several factors need to be considered by a prospective purchaser of a new or used trenching machine. There are three basic types of machines and four major manufacturing companies. In general, it may be said that each manufacturer produces a line of trenchers which serve satisfactorily on several kinds of ditching work. At the same time, each of the manufacturers is recognized as a specialist in one branch of the trenching field: Buckeye in the oil fields; Cleveland for utilities; Parsons for sewer and water;



OUTSTANDING IMPROVEMENT in mechanical design of Parsons Model 250 medium-sized trenching machine consists of mounting on Koehring-type crawler tracks, recognized as one of best-designed tracks for trouble-free operation in excavator field. Use of these rugged tracks eliminates one of most common causes of difficulties in trenching machine operation. Narrow conveyor belt requires heavy loading to handle large capacity and provides small clearance for disposing of obstructions.

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MANY HUNDREDS of Parsons Model 21 (below) still are in use, although manufacture of this machine has been discontinued. Useful for small water and sewer jobs, this trencher was first offset-boom model made. Note three-point suspension of main frame on track mounting, forerunner of three-point suspension construction still used on Parsons various models.



THOMAS MORRIS (below), author of accompanying notes, takes turn at operating one of his Cleveland Model 95 trenching machines on 60-mi. natural-gas pipeline job for housing project of 5,200 demountable houses in Newport News, Va. Machine is riding on crust of frozen ground across swamp, and work has to be restricted to few early morning hours each day before ground softens and lets machine break through.





BANK SLOPING DEVICE built of two grader blades mounted on boom of Cleveland 140 wheel-type ditcher is ideal tool for open-ditch farm drainage. Note clean, level trench left by crumber. Digging wheel floats entirely on crumber, which slides on damp bottom of trench.



BANK SPUDDING with slice bars cuts banks back to stable slope and feeds material directly into buckets of ladder-type trencher, thus eliminating difficulty and expense of close-sheeting trench. By means of spudding, about 300 ft. per day of sewer is laid at minimum cost.

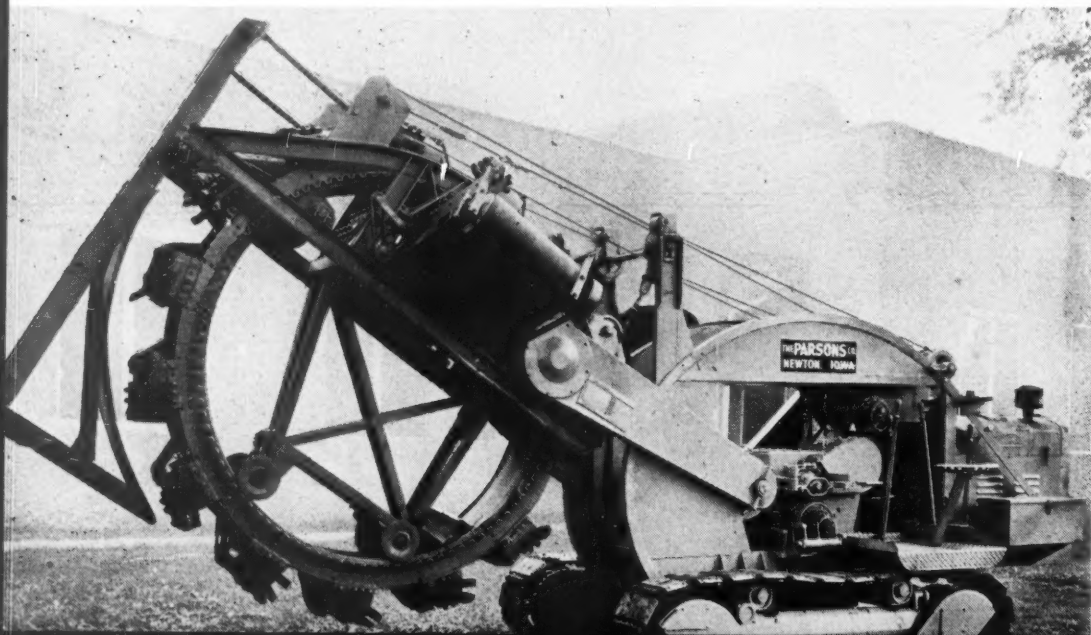
With Main Transmission (and Digging Wheel) in	Traction speeds available in either direction FEET PER MINUTE											
	.4	.6	.9	1.2	1.7	2.3	2.8	3.8	4.5	10.2	18.5	31.5
First Speed												
Second Speed	.9	1.2	1.8	2.5	3.2	4.5	5.5	7.5	8.8	20	36	61
Third Speed	1.7	2.3	3.5	4.8	6.5	9	11	15	17.5	39	72	122
High Speed (ordinarily used when digging).	2.8	3.8	5.8	8	10.6	15	19	24.5	29	65	119	200
Reverse (not used when dig- ging).	.4	.5	.7	1	1.3	1.8	2.2	3.1	3.6	8.2	15	25

Bold face type indicates digging speeds. Light face type indicates road speeds.

TABLE of digging and road speeds indicates range of typical speeds found in one standard, medium-size trencher (Cleveland 95). Other trenching machines offer similar range of speeds, with slight variations, according to size.

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POST-WAR WHEEL-TYPE TRENCHER (below), designed and under test by Parsons Co., indicates progress toward goal of desirable features set up by experienced users of ditching machines. Model 200 apparently includes reliable Koehring-type crawler tracks; inclosed chains, gears and sprockets; and Twin-Disc steering clutches; it seems also to have power shift conveyor, another good feature. Crumber and leveler, attached to rear of boom, slides on damp bottom of trench and maintains accurate grade regardless of ups and downs of front end of machine. This kind of attachment, which can be used with wheel-type and vertical-boom ditchers, leaves clean trench behind machine.



and Barber-Greene for house connections and footings. The three kinds of trenching machines are the wheel type made by Cleveland, Buckeye and Parsons; the ladder type made by Buckeye, Cleveland and Parsons; and the vertical-boom type, made by Barber-Greene.

Most popular and speediest trencher model is a wheel-type machine which digs a 5-ft. 6-in. depth and a width from 11 to 24 in. This is the size most used in the utility field, and the Cleveland Trencher Co. has made a specialty of producing a model to fit these digging requirements. Obstructions up to 1/2-

TESTING FOR BUGS (below), Parsons operator puts new post-war Model 200 through its paces to determine what parts need to be reinforced or redesigned. Thorough testing of new designs by manufacturers saves first buyers of new models from bearing heavy cost for engineering experimentation necessary to improve untried machines.



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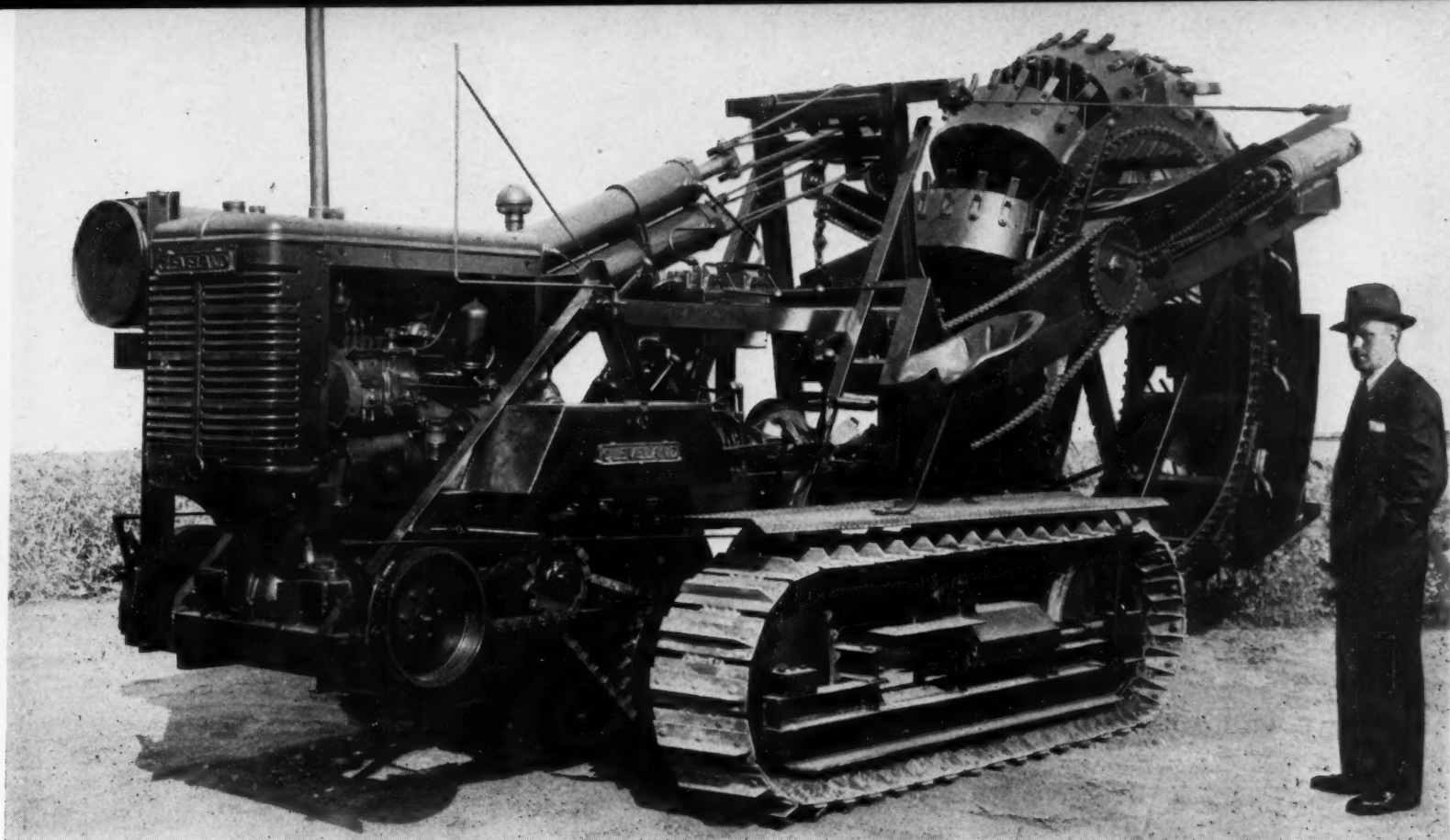
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July 1945



WIDE BUCKETS on Cleveland 140 wheel-type model dig trench of 26-in. width. Side cutters can be added to dig 30 in. wide. UD-9 diesel engine provides balanced power for this machine, and hydraulic hoist makes for fast raising and lowering of boom. THOMAS MORRIS, standing beside machine, owns and operates two Model 140's, both of which have been converted by him from tracks shown here to tractor-type tracks with smooth shoes.

TRENCHING MACHINES—Principal Dimensions and Characteristics

Make	Model	Weight, lb.	Boom const.	Cutting width, in.	Cutting depth	Total overall width	Total overall length	Overall ht. for shipping	Width and Length of tracks, c. to c. of bearings	Pressure under tracks, psi.	Engine hp.
B-G	44-C	19,800	Vertical	12-18	4'0"	7'2"	16'10"	10'6"	14" x 7'6"	7.9	62
B-G	44-C	20,000	Vertical	12-18	5'6"	7'2"	16'10"	12'0"	14" x 7'6"	8	62
B-G	44-C	20,400	Vertical	18-24	4'0"	7'2"	16'10"	10'6"	14" x 7'6"	8.1	62
B-G	44-C	20,500	Vertical	18-24	5'6"	7'2"	16'10"	12'0"	14" x 7'6"	8.1	62
B-G	44-C	21,100	Vertical	18-24	7'0"	7'2"	17'6"	13'6"	14" x 7'6"	8.4	62
B-G	44-C	22,700	Vertical	18-24	8'3"	7'2"	17'9"	10'6"	14" x 7'6"	9	62
Buck.	11	10,000	Wheel	10-22	5'6"	4'2"	21'6"	8'6"	10 1/2" x 5'6"	6	38
Buck.	12	16,500	Wheel	10-30	5'6"	6'10"	25'0"	8'6 1/2"	15" x 7'9"	6	63
Buck.	32	32,000	Wheel	15 1/2-30	6'6"	9'3"	32'7"	10'9 3/4"	24" x 6'0"	6	71
Buck.	36	31,000	Wheel	15-30	6'6"	10'4"	32'6"	11'8 3/4"	24" x 6'0"	6	55
Buck.	46	42,000	Wheel	15-34	7'6"	10'4 1/2"	39'0"	13'0"	24" x 6'0"	8	75
Buck.	48	46,000	Wheel	22-40	7'6"	10'5 1/2"	42'0"	13'0"	28" x 6'6"	8.4	90
Buck.	410	13,000	Ladder	18-24	8'0"	4'10 1/2"	22'9"	8'6"	10 1/2" x 8'0"	6	50
Buck.	120	25,500	Ladder	16-42	11'6"	6'4"	29'6"	11'10"	14" x 8'9"	9	60
Buck.	160	35,000	Ladder	16 1/2-48	12'6"	7'1"	34'0"	12'6"	18" x 8'4"	9	65
Buck.	201	49,000	Ladder	24-40	15'0"	10'8"	49'6"	11'3"	24" x 5'6"	9	100
Buck.	203	62,000	Ladder	24-41	18'0"	10'8"	57'0"	12'3"	28" x 6'0"	9	105
Buck.	260	113,000	Ladder	32-144	24'0"	12'2"	67'0"	13'1"	28" x 9'0"	10.4	135
Cleve.	95	11,000	Wheel	11-24	5'6"	4'9 1/2"	21'	8'10"	10" x 5'9"	8	43
Cleve.	110	12,000	Wheel	11-24	5'6"	5'11 1/2"	23'3"	8'10"	12" x 5'9"	6.4	43
Cleve.	140	14,000	Wheel	18-30	5'4"	7'2"	24'7"	8'10"	16" x 6'11"	5.3	43
Cleve.	170	17,000	Ladder	22-30	12'0"	5'3"	37'	11'4"	12" x 7'6"	8	43
Pars.	21*	19,000	Ladder	16-36	7'0"	6'6"	18'6"	10'6"	14" x 7'9"	7.3	45
Pars.	221	21,000	Ladder	16-36	8'0"	7'11"	25'6"	11'0"	16" x 7'6"	7	55
Pars.	25*	27,000	Ladder	16-42	12'0"	7'0"	27'6"	11'8"	15" x 7'9"	8	65
Pars.	250	26,000	Ladder	16-42	12'6"	7'0"	32'0"	11'6"	18" x 9'0"	6.5	65
Pars.	310	40,000	Ladder	18-54	15'0"	8'8"	35'0"	13'0"	16" x 11'0"	8.5	90
Pars.	200	19,000	Wheel	15-26	5'6"	6'10"	24'6"	10'0"	18" x 7'6"	6	55

B-G. Barber-Greene Co.

Buck., Buckeye Traction Ditcher Co.

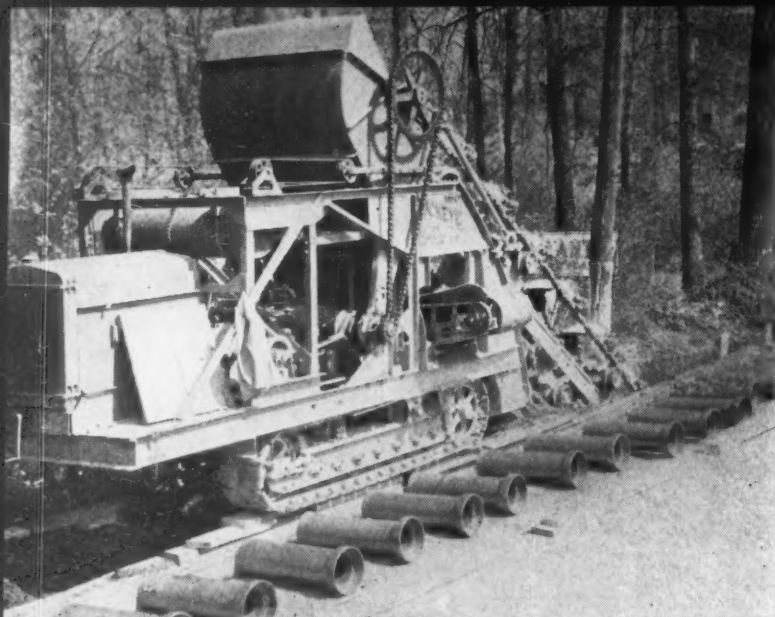
Cleve., Cleveland and Trencher Co.

Pars., Parsons Co.

*Pars. 21 and 25 have been superseded by Models 221 and 250

LARGEST WHEEL TRENCHER (right) is Buckeye Model 48, weighing 23 tons, equipped with 90-hp. diesel engine. Heavily-built machine is designed particularly for cross-country oil and gas pipeline trenching where hard, heavy digging is encountered. Under favorable conditions, machine can dig 1 1/2 mi. a day. This trencher is second unit in headpiece picture of two machines operating in tandem on one pipeline trench. Long machine with front end on wheels to counterbalance heavy digging wheel at rear is typical of Buckeye oilfield trenchers.

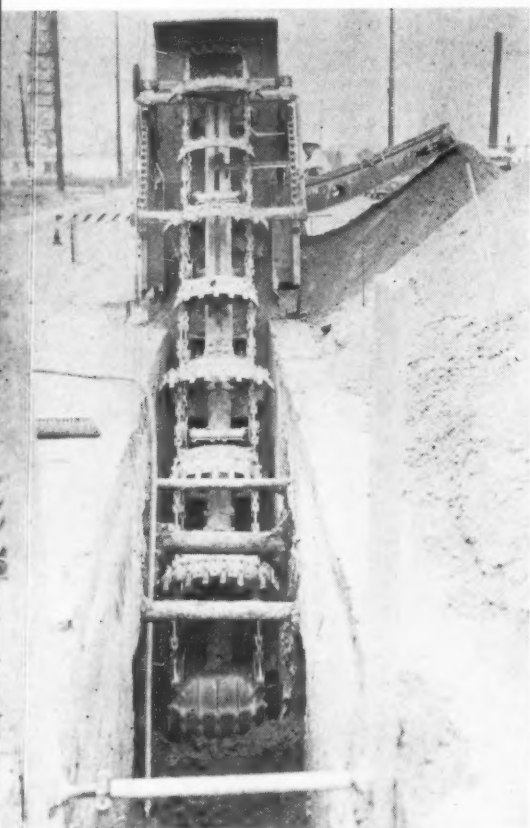




PARTICULARLY ADAPTED to sewer and water-main trenching of medium-heavy type, Buckeye Model 160 ladder-type unit is largest full-crawler machine made by this manufacturer.



RIVAL OF WHEEL DITCHERS in utility field is this ladder-type machine with high-speed bucket line, low overhead height, narrow width and good maneuverability. Buckeye Model 410 is one of manufacturer's latest machines.



TRENCH FOR BUILDING FOUNDATION is excavated by vertical-boom ditcher especially adapted to this kind of work. Raised position of vertical boom of Barber-Greene Model 44-C indicates that machine is cutting trench only about 2 ft. deep. Boom can be lowered to dig to 7-ft. depth.

LARGE-SCALE EARTHMOVING (below) marks operation of Buckeye Model 260 ladder-type trencher weighing nearly 60 tons, which digs more than 400 lin.ft. 23 to 31 ft. deep and 8 ft. wide in 8-hr. shift on this job of rerouting sewer. Volume of earth excavated per day from this trench ranges between 3,000 and 4,000 cu.-yd. in 8 hr. Boom extension is added to enable machine to dig beyond 24-ft. standard depth. With rotary side cutters, machine can excavate trench 12 ft. wide. This model is world's largest ditcher.

cu.yd. can be handled by this machine.

A trench of 11-in. width is about the minimum that can be cut successfully. Job experience has consistently shown that a machine cutting a width of less than 11 in. gives continuous trouble with stones and gumbo sticking in the narrow buckets. Furthermore, trenches of less than 11-in. width are too narrow to back-fill and tamp properly.

Larger wheel-type trenchers, built by Buckeye, with digging wheels up to 40 in. by 7½ ft. for use in the oil fields, are designed for heavier weight and sturdier construction to maintain speed through shale, soft rock and hardpan. Boulders, broken concrete and other obstructions up to 1-cu.yd. size can be handled successfully by one of these large wheel trenchers.

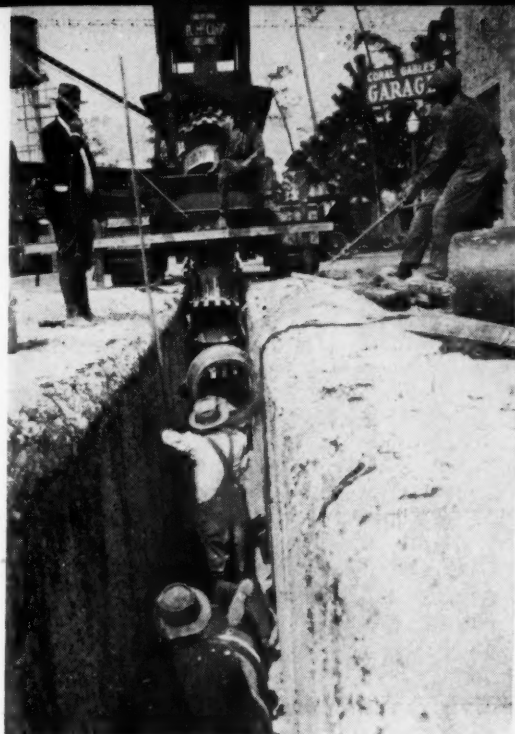
Designed for heavier and deeper digging of trenches for drainage, sewer and water lines, the ladder-type machine, specialized in by the Parsons Co., although not so fast as the wheel type, can very easily handle obstructions up to 1 cu.yd. In loose material, the trench banks can be sloped into the digging buckets as the machine progresses, thereby saving the cost of sheeting. The offset boom is recommended for close-quarter jobs.

Designed for precision ditching, the vertical-boom type, made by Barber-Greene, is an excellent machine for digging footings, as the unit leaves a square bottom and vertical walls ready for the placing of concrete, eliminating forms and handwork. The vertical-boom machine also is useful for cutting ditches for services and all small utility installations. A model cutting 5 ft. 6 in. deep and 18 to 24 in. wide is the most practical size. Users appreciate as a good feature of this machine the engineered built-in take-up arrangement for every shaft and chain.

Excavating Capacity—Comparison of a medium-size trenching machine with a 1½-cu.yd. shovel gives an idea of the machine's capacity for eating up earth. A machine digging a ditch 2 ft. wide and

AGILITY IN DIGGING through maze of pipes is shown by Buckeye Model 120 ladder-type ditcher which has just passed three pipes in this trench. Machine first digs up to and over them and then backs boom under pipes, practically eliminating hand work.





LARGE, WHEEL-TYPE DITCHER digs trench in coral rock in Florida in 1925. This machine, one of largest of its type, operates 14-ft. cutting wheel to dig trenches 3 ft. wide and 14 ft. deep. **THOMAS MORRIS**, author, is seated on back of boom in both photographs.

VERTICAL-BOOM DITCHER, Barber-Greene Model 44C, digs clean-cut square-bottom trench. With operator wearing head phones of pipe detector, this machine works well among city services and mains. Note follow-up crumbler which slides on boom and rides on bottom of trench under its own weight.

4 ft. 6 in. deep at a speed of 14 ft. per min. will excavate 2,800 cu.yd. in a 10-hr. day. In the same time, a $1\frac{1}{2}$ -cu.yd. shovel, making three passes per minute, will excavate 2,700 cu.yd., on the basis of rated capacity. Neither machine, of course, can do the other's work, but the comparison does show relative capacity.

Use of Machine—Trenching machines ought to be used on the kind of work for which they have been designed. I have seen powerful ladder-type trenchers ruined by trying to use them for digging footings and services. Continual twisting and turning of the big ditchers to follow short trenches bend and crack up the tracks. Small machines similarly have been ruined by overwork in attempting to dig large sewer trenches.

Models of trenching machines at present
(Continued on page 152)

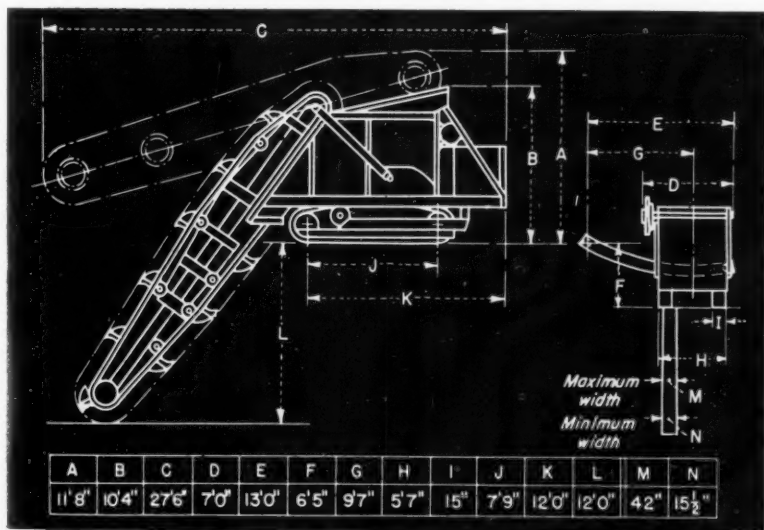


LONG, HIGH CONVEYOR with 180-deg. swing, here stacking spoil on either side of trench, can be used also to load trucks or build up roadway in front of Cleveland Model 170. Narrow width, only 62 in. overall, permits this trencher to dig for installation of sewers inside limits of sidewalks.



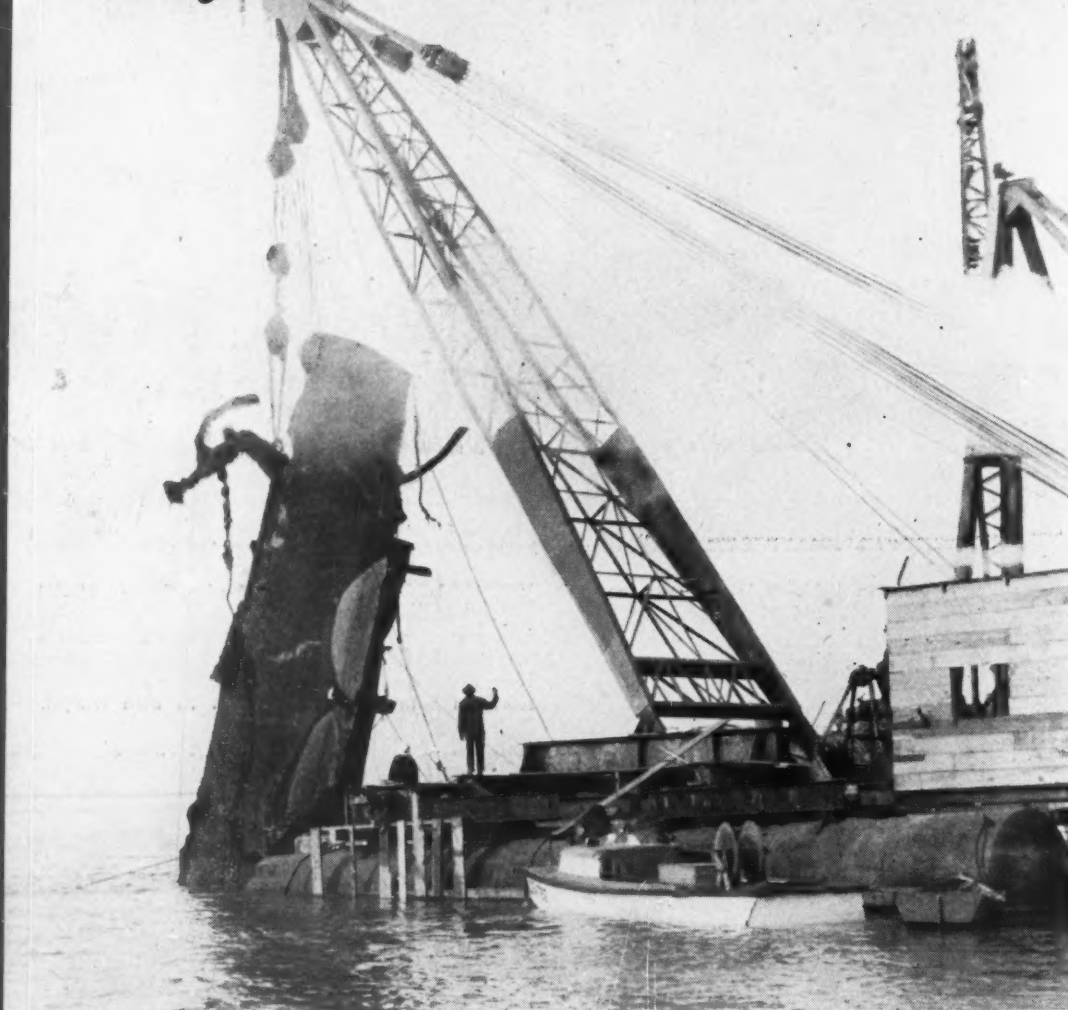
FOR PRACTICAL USE of owner or buyer (below), this method of presenting complete dimensions (of Parsons 25) on one page of manufacturer's catalog appears to offer clearest and quickest means of taking off needed information.

TRACTOR-DRAWN PLOW (below) operates effectively to depth of 18 in. in sand and wet earth for cable laying and drainage trenches. This type of plow has excavated up to 3 mi. per day for author.



Hazardous Marine Salvage

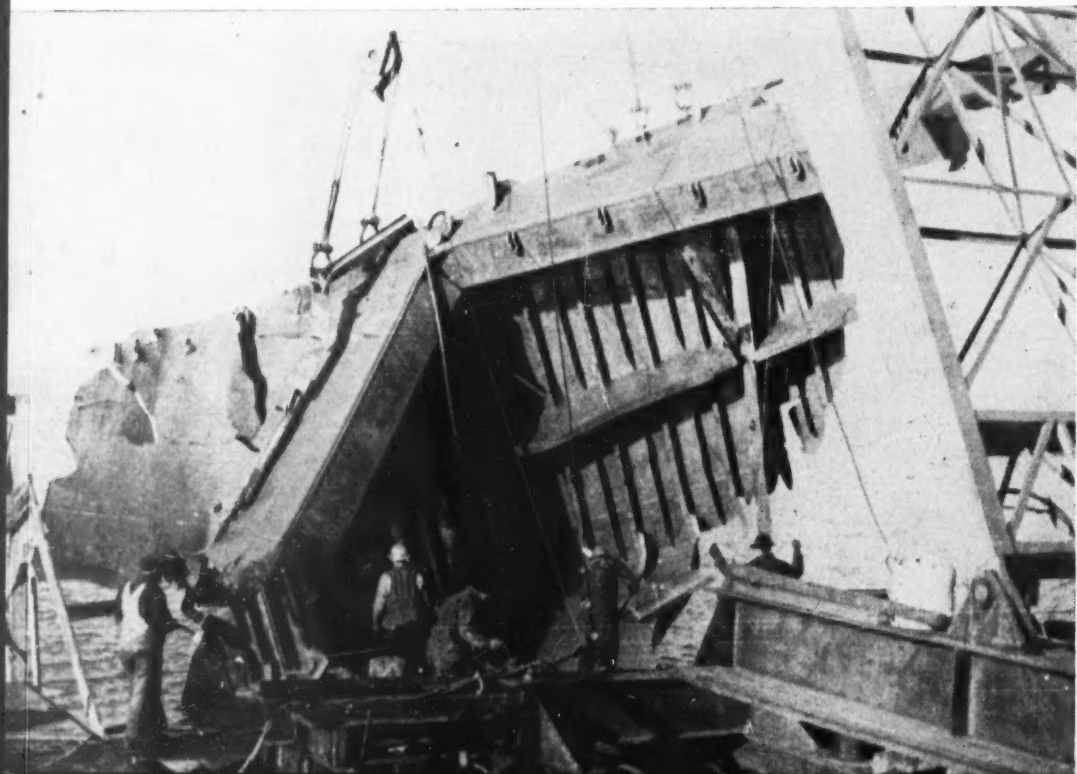
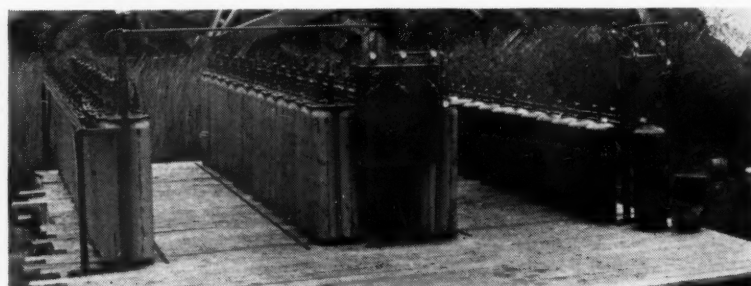
Removes Wreckage of Blasted Ammunition Ships From Water 25-50 Ft. Deep



SPECIALLY DESIGNED DERRICK BARGE equipped with A-frame capable of lifting 200 tons, raises side hull and part of deck covering of one of two ammunition ships, blown up in disastrous Port Chicago explosion in July of last year. Two steel pontoons give added buoyancy and stability.

SECTION OF VICTORY SHIP'S HATCH (below) is pulled from bay floor. To break up large sections of ships for removal, underwater oxygen-hydrogen cutting torches had to be used against sections containing ammunition and oil.

BATTERY OF OXYGEN AND ACETYLENE TANKS supplies torches for cutting piles of salvaged steel to smelter size.



ONE OF THE MOST HAZARDOUS and delicate submarine demolition jobs confronted by West Coast contractors, the underwater clean-up of wreckage of two ammunition ships blown-up in last July's disastrous explosion at Port Chicago, Calif., but which still contained tons of unexpended ammunition, was completed in April without a single lost time accident.

Joint venture of J. D. Proctor, Inc., and LeBoeuf-Dougherty & Co. of Point Richmond, the operation entailed repeated use of underwater oxygen-hydrogen cutting torches against sections containing live explosives and tanks in which large amounts of oil were trapped. Further complicating the job were sharp, jagged steel fragments in the black waters of the bay bottom which jeopardized divers' life lines.

Most delicate operation, according to engineers, was the removal of two submerged box cars, one containing 325-lb. aerial depth charges and the other magnesium and thermite incendiary bombs, which had been blasted from their tracks. They were lifted intact, removed to an uninhabited island and buried in 40-ft. trenches.

Because no equipment capable of handling some of the huge blast-torn ship sections was available in the San Francisco Bay area, special equipment was hurriedly designed and built by the contractors, including a derrick barge and A-frame.

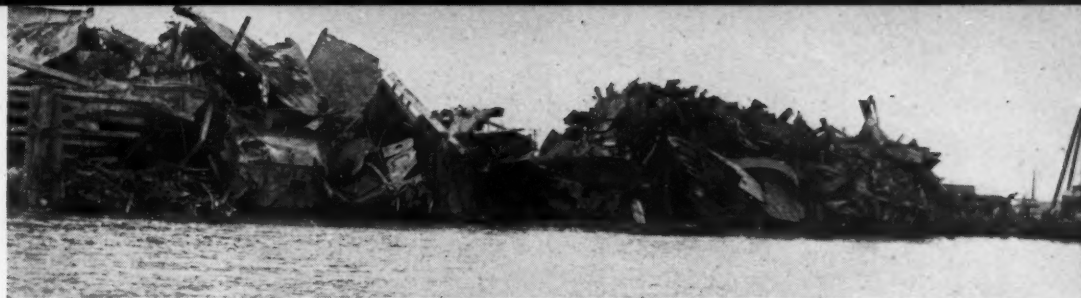
To locate scattered bits of hull, explosives and steel fragments from an area of about 1,500x3,000 ft. under from 25 to 50 ft. of water after largest sections had been cleared, a steel cable was fastened between two tugs. The area was dragged



READY FOR DESCENT into bay waters is J. D. PROCTOR, president of one of the firms which undertook to cleanup underwater wreckage at Port Chicago. Considered one of country's ablest industrial divers, Mr. Proctor followed his custom of leading way for his diving crews. He had charge of underwater work, including reconnaissance, layout, rigging, burning and blasting.

until the cable caught on an object. Then a diver would follow the cable down to investigate. Such objects as could not be raised with the A-frame were marked with buoys to be cut and raised later.

Harry W. Erickson, vice-president of J. D. Proctor, Inc., supervised field operations, while J. D. Proctor, president, had charge of underwater work.



TWISTED STEEL removed from bottom of Suisun Bay at Port Chicago, wreckage of two ammunition ships, is piled along shore. Derrick barge, which salvaged wreckage from an area 1,500 x 3,000 ft., is shown at right.



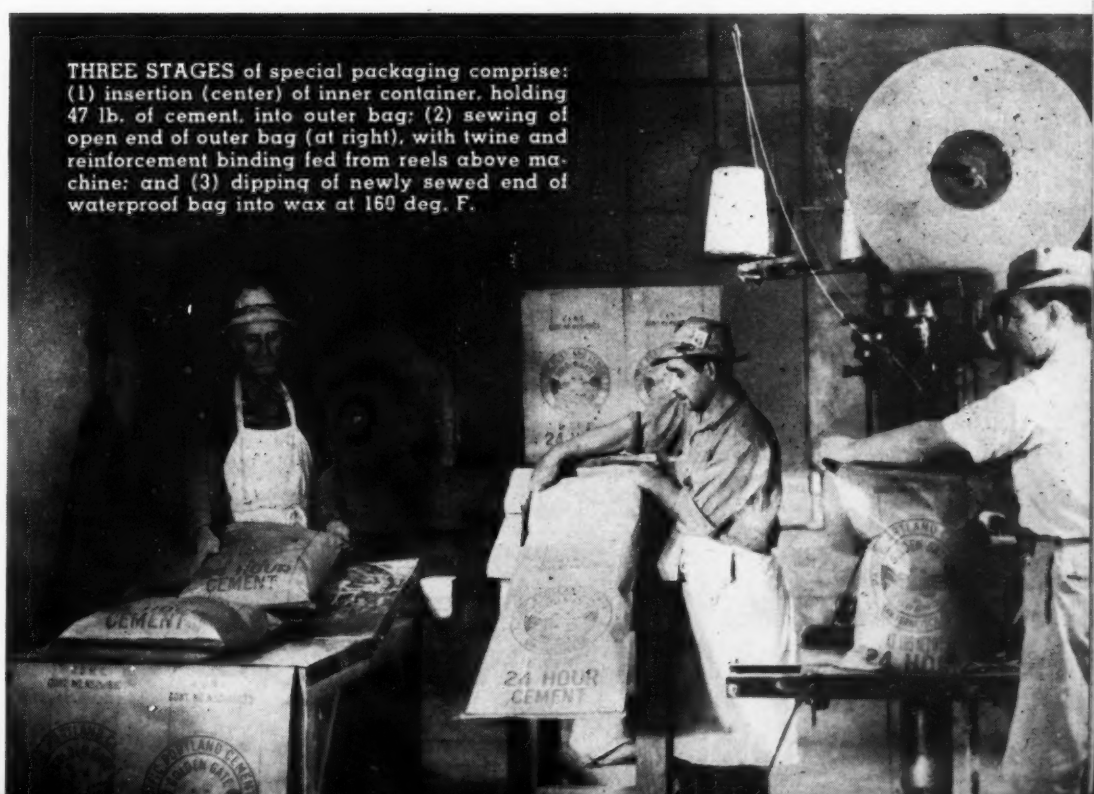
PLANT SET-UP to handle cleaning and burning to size of steel for delivery to smelter is shown above. Fragments were loaded on to trucks with an electric magnet, visible at end of crane cable. On crane boom is drum for taking up slack in power line to magnet.

Half-Size Cement Sack FITS COMBAT NEEDS

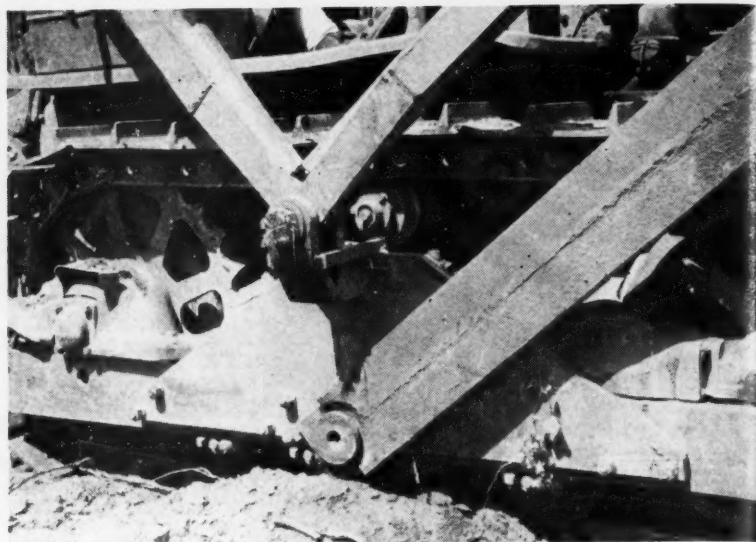
WHERE CEMENT IS BEING USED for military construction close to the front lines, ordinary 1-cu.ft. (94-lb.) sacks are too heavy for quick and easy handling. After seeing cement sacks opened and part of the contents dumped out to speed safe handling of the remainder, it is easy to understand why the U. S. Marine Corps would want cement in smaller packages.

Another point is the need for extra protection against moisture in the humid tropics, particularly when cement has to go ashore with troops that land the hard way. Packages that contain $\frac{1}{2}$ cu.ft., inserted in double the usual paper bag thickness with the final package dipped in waterproofing wax, have many advantages. Just how the 47-lb. sacks are packed in the plant of the Pacific Portland Cement Co. near San Francisco is shown in the accompanying photograph.

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THREE STAGES of special packaging comprise: (1) insertion (center) of inner container, holding 47 lb. of cement, into outer bag; (2) sewing of open end of outer bag (at right), with twine and reinforcement binding fed from reels above machine; and (3) dipping of newly sewed end of waterproof bag into wax at 160 deg. F.



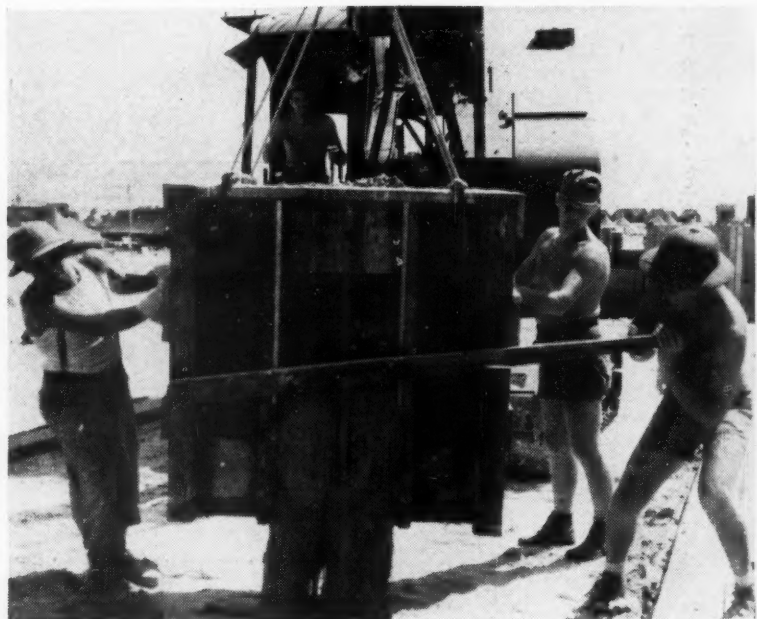
TRACTOR CRANE UNIT of scrap parts installed on Hyster-Caterpillar bulldozer (left) loads coconut logs on to truck. Built by heavy equipment department of special U. S. Naval Construction Battalion, crane has 6-ton load limit at 15 ft. radius. Hand-forged bushings (right) are used to connect boom to blade arm bracket. Pulleys and blocks are hand forged and 3½-in. angle iron welded together forms 7-in. channel iron for boom. Change from blade to boom can be made in 30 min.

HOW

They Did It

CONSTRUCTION DETAILS

For Superintendents and Foremen

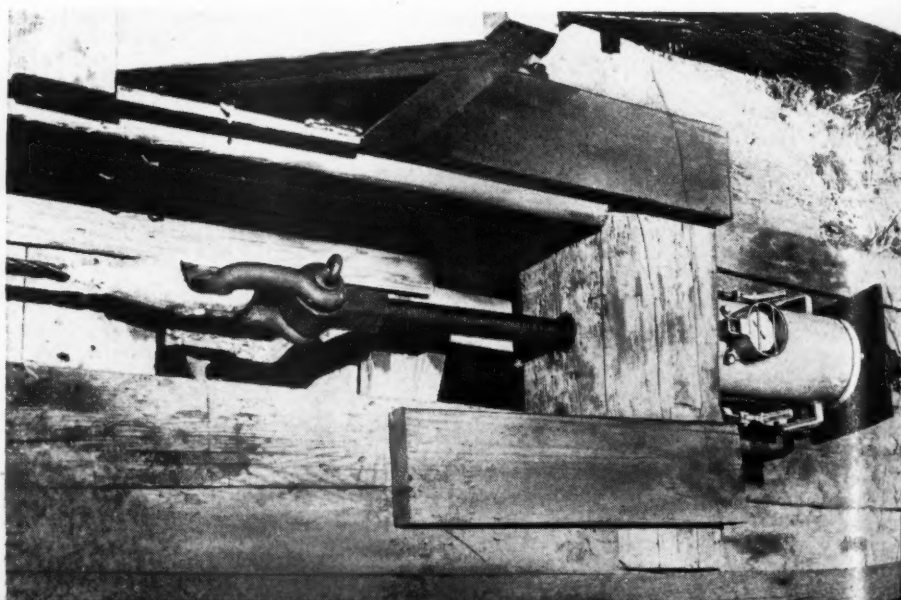
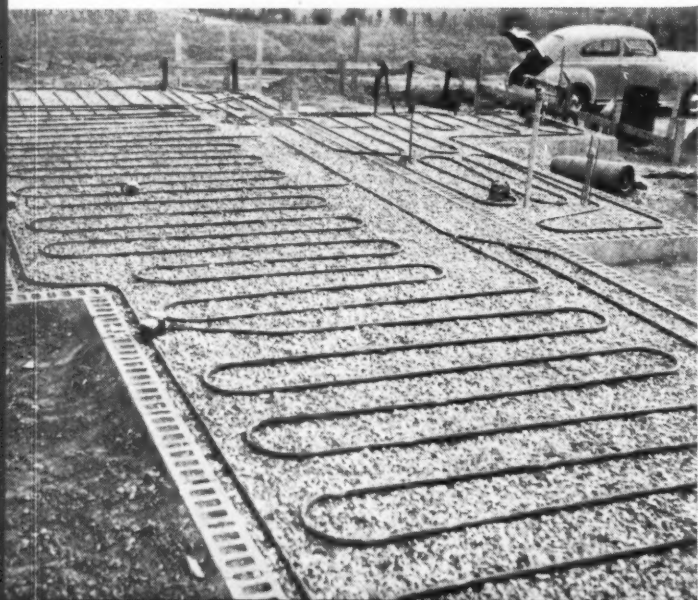


JOB-MADE WOOD BUCKET with sliding side gate controlled by lever arm for pouring concrete is product of Seabee ingenuity at spare-parts sub-depot at Pacific base.

Page 82

RADIANT HEATING SYSTEM (below) is installed in residence at Lancaster, Pa. Floor-type system uses ¾-, 1- and 1½-in. Byers wrought-iron pipe which was fabricated at job site and embedded in concrete floor. Photo shows pipes in place on crushed stone fill before concrete pouring.

TENSILE TEST (below) of 1½-in. cable sling is made by Simplex jenny center hole hydraulic puller of 100-ton capacity. Clevis through deadeye is secured to long bolt which has been inserted through jenny and fastened above cylindrical ram. Dial shows pulling power applied. Unit, made by Templeton, Kenly & Co., of Chicago, Ill., is mainly used for heavy-duty pulling, pushing and lifting jobs.



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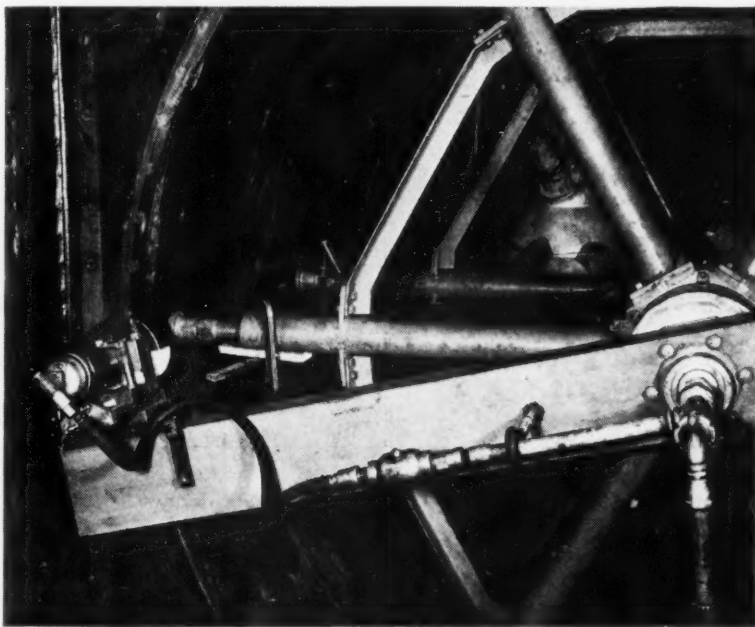
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HAND PUMP is used to remove water inside ponton crossing constructed in Europe by American troops.
Signal Corps Photo

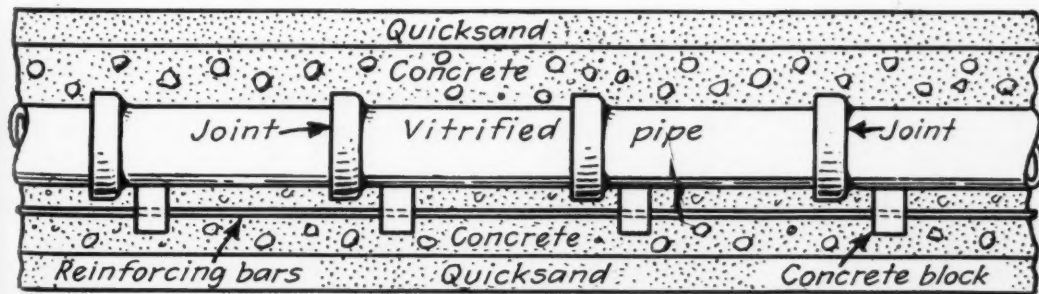


TRENCH IS DUG, by Morrison Co. ditcher (above and below, right) for U. S. Bureau of Reclamation. Machine is built up Killefer plow consisting mainly of two 12-in. plow blades back to back behind Isaacson nipper blade which rides 3 to 4 in. below plow blades and ahead of two grader blades set at slope of ditch. It is followed by drag with adjustable strikeoff piece built to shape of ditch.



SEAL RINGS OF 102-IN. VALVES (above) in outlet tubes at Grand Coulee Dam are reconditioned by special machine designed and built on project. A 4½-in. hollow shaft, journaled in piece of 6-in. heavy-duty pipe, is aligned accurately on center line of valve seat by two sets of radial screw-jacks set against lining of outlet tube. At end of a radial arm, attached to 4½-in. shaft and rotated twice a minute by air motor and worm gear, compound tool rest is mounted. Seal ring is first dressed with lathe tool in compound rest and is then finished with air-driven grinding wheel.

Bureau of Reclamation Photo



RIGID SEWER of vitrified pipe in concrete encasement reinforced with longitudinal bottom rods to prevent joint breaks caused by soil movements is constructed by T. A. Newman, contractor, Texas City, Tex., 3 to 10 ft. below water table in trench of water-quicksand kept dry with well-points and pumps by John W. Stang Corp., Houston, operating under separate contract. Sewer contractor builds 3,000 ft. of this type of concrete-encased pipe, designed by Joseph J. Rady, consulting engineer, Fort Worth, Tex. to meet requirements of unstable location roughly parallel with Galveston Bay about 100 ft. from shoreline.





WEST PORTAL CUT reveals several phases of protective operations undertaken to make slopes safe against rock falls or slides. Behind temporary timber barricades on top of rock bank at left, hazardous rock broken loose without use of explosives is loaded into skips. Pneumatic tools for rock work receive air from diesel compressor in open shed at top of excavation. Next to westbound track, at right, forms are in place for concrete walls to support rock face. On right bank, in middle distance is stone masonry wall built of excavated material to retain earth slope.

TIMBER BARRICADES (below) rest on I-beams spanning recesses in rock face. Beams and timber panels are tied back by steel cables to anchor rods embedded in holes drilled in hard rock. Removal of unsafe rock is made necessary by disintegration of seams of hardpan between layers of sound sandstone. Temporary timber barriers keep dislodged rock from rolling over bank and permit men to work in complete security.



Safeguards MINIMIZE H

In Removing Rock from RAILROAD CUTS

VIGILANT APPLICATION OF METHODS to prevent rock falls and maintain continuous operation of trains on the double-track main line of the New York, New Haven & Hartford R.R. is the controlling characteristic of work now being performed by C. W. Blakeslee & Sons, Inc., contractor, New Haven, Conn., in removing dangerous rock from steep banks of portal cuts at both ends of the Fair Haven tunnel, about 4 mi. east of the city. As a protective measure, to prevent falls of both rock and men down the precipitous slopes, special timber barricades are secured to the faces of the banks, just below the points where excavating crews are at work, by means of wire-rope cables tied to steel rods set in drilled holes in sound rock.

Use of explosives is prohibited, and hard rock designated

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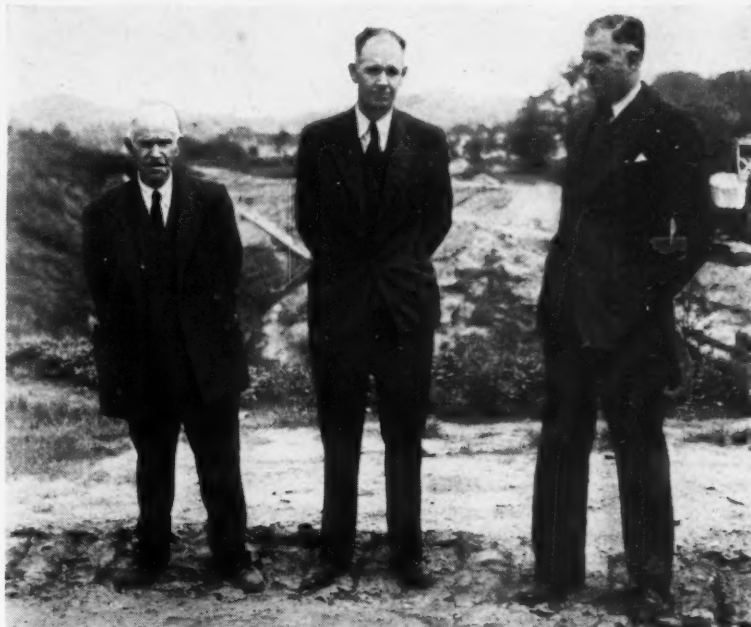
CONCRETE BUCKET hung from 80-ft. boom of crane at top of bank discharges into space between panel forms and rock face, to which concrete wall is firmly anchored with steel dowels. Portable vibrators are used for internal vibration of concrete.

for removal is broken with pneumatic pavement breakers and jackhammer drills and with plugs and feathers. Where rock in the lower lifts can be adequately supported with concrete walls and piers, thus saving a large amount of excavation which otherwise would be necessary



CONCRETE WALLS AND PIERS support steep rock faces and minimize disintegration, making banks safe at less cost than would be required for backsloping. Ample number of weep holes is provided through concrete for drainage of water from behind walls.

→
RAILROAD CUTS at two ends of tunnel are made safer by work done under direction of these men: (Left to right) **WILLIAM H. RYAN**, superintendent for this job, picking up where he left off 52 years ago, when he served as superintendent on one end of original tunnel contract; **RAYMOND S. POWELSON**, representing New York, New Haven & Hartford R.R.; and **ALBERT D. BLAKESLEE**, secretary, C. W. Blakeslee & Sons, Inc., contractor.



OPERATIONS ARE SUSPENDED, as indicated by bucket of concrete stopped in transit, until long freight train with diesel-electric locomotive pulls past site of work.



LE Hazards

in sloping back a bank from the bottom to the top, the railroad engineers direct construction of concrete work to a minimum thickness of 1 ft. All the concrete is anchored to hard rock by numerous steel dowels grouted in holes drilled at varied angles. Determination of the work to be performed on each section of bank is made only after the contractor's forces have exposed the underlying condition of the rock.

Limited Working Time

Work can be performed by the contractor's crews only when both tracks of the busy main line are clear. Railroad flagmen stationed at control offices near the two portals of the tunnel, at points from which both cuts can be observed, are in complete charge of working time. Advance information regarding train movement is telephoned to them from both directions, and they stop all activi-



SAFETY OF OPERATIONS is criterion governing all work by contractor in removing dangerous rock and protecting cut banks. Barricades are erected at each point of excavation. Hard sandstone is cut away where disintegrated hardpan seams make rock falls possible.



ties as soon as each train comes into view. Signals are exchanged between these men to assure maximum protection and full utilization of all available working time.

After a train has passed, operations are not permitted to resume until smoke clears from the 1,200-ft. tunnel, again affording visibility both ways. Because of the heavy traffic, the contractor's operations are reduced as much as 15 min. per

hr. during some parts of the day. Two crews, one in each cut, work an 8-hr. day and a 45-hr. week, weather permitting. A shortage of workmen in the area prevents the contractor from building up the size of the crews. On a typical day recently, 22 men were at work in the two cuts.

Depth of the two rock cuts ranges up to 70 or 80 ft. at the tunnel portals. The cut west of the tunnel is 2,160 ft. long;

LARGE AIR RECEIVER provides greater flexibility in furnishing power to pneumatic tools from 105-cfm. compressor. At right is dump truck arriving on job to be loaded by crane.

that to the east is 1,885 ft. in length. Banks of the cuts are predominantly rock, with earth overburden varying from zero to as much as 30 ft. in some pockets. East Haven hard red sandstone makes up the bulk of the rock formation, but this hard rock is interbedded with seams of hardpan, a shale-like material which weathers upon exposure, and is separated by vertical sections of trap rock, which also disintegrates upon exposure. On one side of the cuts, the seams incline downward toward the tracks, increasing the danger of falls by blocks of hard rock which might break off above weathered seams. Disintegration of the hardpan has progressed a considerable distance into the

(Continued on page 180)

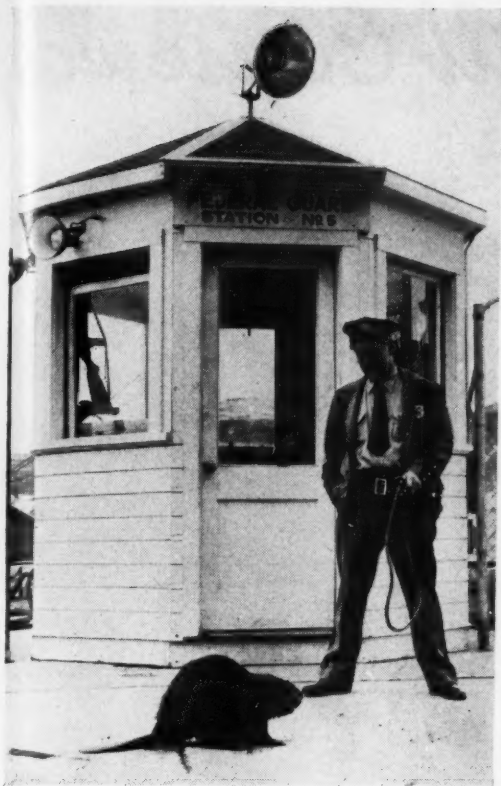
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LIGHTER PANELS (below) sheathed with $\frac{3}{4}$ -in. lumber fill out wings and upper tiers of this barricade. Heavy panels are tied back with wire-rope cables, and wing panel is fastened to anchor rod with twisted steel wire.

HEAVY-DUTY CLAMSHELL (below) handled by crane with 60-ft. boom takes bite out of overburden at top of bank above barricade. Spoil is loaded into dump truck.



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← **WILD BEAVER** inspects world's largest dam. This 30-lb. animal, who has himself earned reputation as dam builder, popped out of Washington's Columbia River, ambled across top of 4,173-ft. wall of Grand Coulee Dam until he met Harry Branton, Bureau of Reclamation Guard, and then plunged into lake.

Wide World Photo

WITH PICKS Seabees at Pacific base perforate metal oil drums welded into sections for use in drainage system.

WOODEN REPLICA OF TANK (below) is examined by U. S. Marine. Dummy was set up on Okinawa by Japanese to lure American bombs and shellfire.

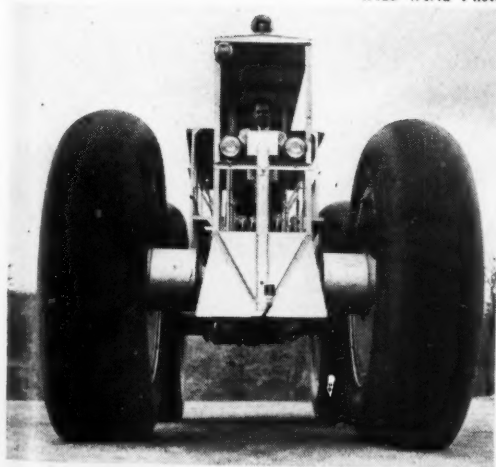
U.S. Marine Corps Photo

JOBS

oddities



Wide World Photo



TIRES 10 FT. HIGH are used on new marsh buggy for oil explorations in Central America and southern United States. Tires and wheels were made by Goodyear Tire & Rubber Co. Hollow air-tight aluminum drums serve as wheels, providing added buoyancy for navigating streams and lakes as well as dry land and marsh. Maximum speed is 4 mph. in water and more than 20 mph. on land.



UPRAISED WINGS on monitor roof of 300x240-ft. forge building for Chevrolet Shell Division, St. Louis, are open-slot gravity ventilators of type manufactured by H. H. Robertson Co., Pittsburgh, providing stack action to exhaust rising warm air and gases. Equipped with hinged dampers to regulate draft through throat 10 ft. wide, ventilators are constructed of corrugated protected metal sheets on steel framing. Rest of steel-frame building is inclosed with corrugated asbestos cement sheets. Alport-Carlo Construction Co., St. Louis, erected superstructure above foundations put in by Dickie Construction Co., of same city, both contractors acting under direction of St. Louis, Mo., Engineer District Office, Corps of Engineers, U.S. Army.

Hydraulic Fill Causeway RE



DISCHARGE PIPELINE from hydraulic dredge backfills canal formed by removal of muck and vegetable matter.

By W. VANCE BAISE

State Highway Engineer,
North Carolina State Highway and
Public Works Commission,
Raleigh, N. C.

HYDRAULIC PLACEMENT of a 1,000,000-cu.yd. causeway fill by the R. C. Huffman Construction Corp., Norfolk, Va., for the State Highway and Public Works Commission is expected to cure one of North Carolina's oldest and costliest highway problems.

Since the day more than 40 years ago when the merchants of Elizabeth City, N. C., decided that the city should have a quicker and cheaper east approach than that afforded by a century-old ferry, the difficulties of improving and speeding up travel across the Pasquotank River and adjacent swamps have caused many headaches. Over this 40-year period the

Camden Ferry Co., organized by the merchants of Elizabeth City, attempted to construct a satisfactory road across what is locally known as Floating Goat's Island.

The ferry, used for moving traffic from the Goat Island toll road across the river to Elizabeth City, was replaced about 1910 by a narrow steel drawbridge with timber approaches. This bridge remained in use until 1931, when a modern bascule steel draw span with reinforced-concrete approaches was completed over the Pasquotank River at a cost of \$392,984.

Toll Road Purchased by State—In 1921, the State Highway Commission pur-

Page 88

OLD FLOATING ROAD (below) near Elizabeth City, N. C., sank in places below natural water level of swamp over which it was built.



DRAWBRIDGE over Pasquotank River (below), completed in 1931, is Elizabeth City connection



REPLACES FLOATING ROAD



COMPLETED FILL at east end of project parallels old creosoted timber causeway, at left.

chased the toll road and made it part of the North Carolina state highway system. At present, the road is designated as U. S. Route 158. When purchased, it was the only highway connecting the Elizabeth City area with Camden and Currituck Counties (N. C.), and with Norfolk, Va. The roadway, consisting of a very shallow earth covering over a light timber causeway, surfaced with a layer of oyster shells, could accommodate only light traffic, at best, and was impassable for long periods of time. The service being inadequate, the State Highway Commission agreed to buy the road in order to improve it.

At that time, it was not considered feasible to fill in the swamp, as Goat Island offered no borrow material. As an alternative, engineers prepared an experimental design for a floating road to consist of a heavy log corduroy over the old road, covered with a thin, earth cushion supporting a reinforced-concrete pavement. Construction of this roadway started in July 1922, and was completed about 1 yr. later. During construction, the original design, which called for a pavement 16 ft. wide with 6-in. curbs, was found to be impracticable, and the design was changed to a pavement width of 17 ft., without curbs.

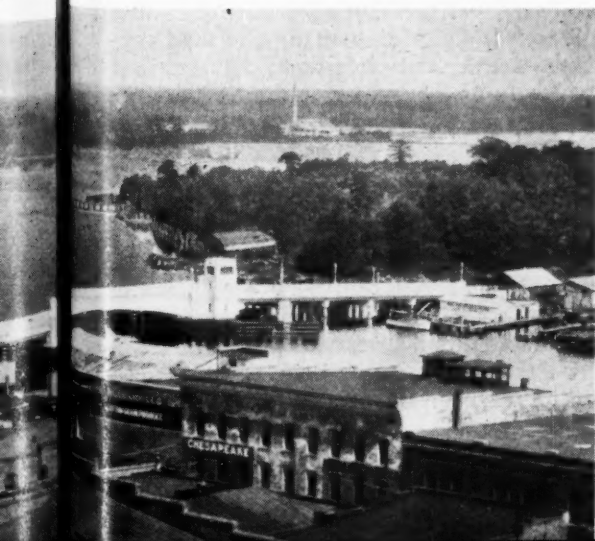
It was believed that the timber corduroy would furnish sufficient support to float the relatively light roadway section; but the arrangement proved unsatisfactory. By the time the job was completed, so much settlement had occurred that in several places normal water level was an inch or more above the surface of the pavement. The entire 2¼-mi. length of roadway settled so much that by 1924 it became extremely difficult for traffic to get through when wind tides raised the water level above normal.

About ¼ mi. of this road on the east end of the swamp, where the root mat

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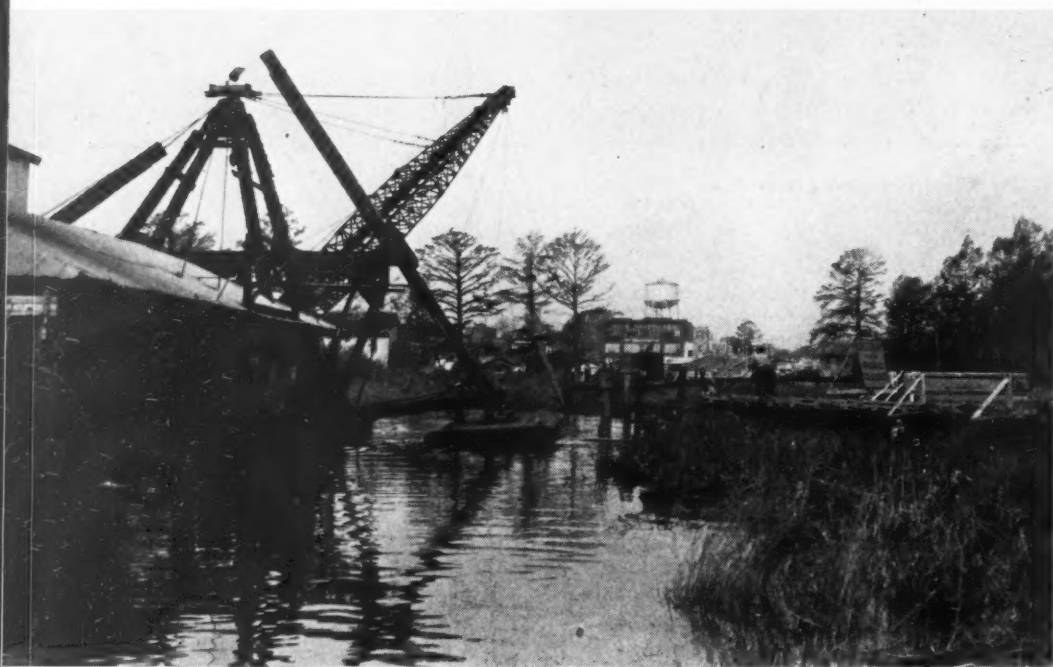
with Floating Goat Island and new causeway. Structure was built at cost of \$392,984.

INUNDATED SECTIONS (below), built up by adding layer of slag, soon subsided and left sections of roadway in flooded condition. Piles along edges of roadway hold side boards in place.





WOODEN BULKHEADS hold hydraulic fill from overflowing on to old floating roadway, sections of which have sunk below water level of swamp.



FLOATING DRAGLINE removes root mat and section of old road, preparatory to dredging operation in which all soft material is removed to depths ranging from 15 to 40 ft.

CREOSOTED TIMBER CAUSEWAY (below) built over unsatisfactory slag sections carried traffic until damage caused by increased speeds and heavier wheel loads called for excessive maintenance.



was heaviest and muck did not exceed 15 ft., is still in service, even though it is covered with water for long periods of time.

Other Experiments Fail

During 1924 and 1925 the necessity for raising sections of the road became apparent. It was decided that by placing slag over the concrete pavement the necessary road surface elevation could be attained. The slag was held in place by boards nailed to timber piles driven on 10-ft. centers along each side of the pavement. Use of the piles as supports for a possible future concrete slab, in case settlement continued, was contemplated. Negative results observed after using this method to build up sections of roadway totaling about $\frac{1}{2}$ mi. in length led to the conclusion that only temporary relief was being obtained and that other means of providing a more permanent type of road would have to be found.

Creosoted Timber Roadway Surface

In 1926 it was decided to raise the elevation of the road by constructing a creosoted timber causeway with a 17-ft. roadway width, supported on the timber piles previously driven for the slag sections. Additional piles were driven along the sections of roadway which had not been treated with slag. The long span between piles on opposite sides of the roadway required the use of 14x16-in. timbers. Construction of the trestle was carried on intermittently by the bridge maintenance department from 1926 through 1931. At that time a continuous section of timber causeway had been completed for a distance of 2 mi. east of the Pasquotank River bridge.

The creosoted timber causeway was

(Continued on page 184)

LEGAL ADVENTURES

of TRACTOR CONN



By **LESLIE JOBB**

No contractor ever tries to be his own dentist or his own shoemaker. It is even more dangerous for him to be his own lawyer. There are, however, some legal rules which every contractor should know, and these rules may be explained in plain English without resorting to the jargon of the law, unintelligible to most laymen.

This series of articles, dealing with the Legal Adventures of Tractor Conn, a typical contractor anywhere in the United States, explains some of these legal points in plain language for the contractor. Each one is based on an actual decision of an American Court.

The Case of the Broken Tractor



Tractor Conn was behind time on the Ajax Arms contract and had managed to place an order for an extra tractor.

"Your tractor came in on the morning way-freight. We'll go down to the freight wharf now," the freight agent told him.

"What's she like, a pretty nice job?" Conn queried.

The agent did not commit himself, but pushed back the door of the freight car and let Conn enter first.

"Say, what's this? An air raid?" Conn exploded. "This tractor's all smashed up. The magneto base is busted and there is a crack in the steering gear case I could shove my fist into. That bill of lading says you fellows got it in good shape. What are you going to do about it?"

"I'll agree it is broken, but all the breaks are old."

"Well, if you agree it's broken, I'll take it as is, and sue the railway for the cost of the necessary repairs," Tractor Conn suggested.

"You can't take it unless you sign the usual receipt saying the tractor is in good shape, except for an 'old break,'" the agent told him.

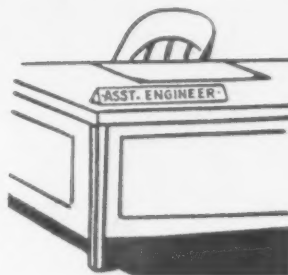
"I may be just a plain contractor, but I'm not that easy. I'm not going to take delivery of the tractor when the only way I can get it is to sign a paper that cuts me out of collecting damages. Keep it and I'll sue the railway for the full price," Conn threatened.

The freight agent stuck to his guns. So did Conn and the Supreme Court of Nebraska decided in his favor on the ground that the freight agent had no right to demand such a receipt

and when the agent refused to deliver the tractor without it there was a "conversion" of the tractor by the railway.

"The age of the break was in dispute, and the refusal of the railway to deliver the tractor to Tractor Conn without a receipt from the latter admitting that the injury complained of was an 'old break' was unreasonable. In law, it amounted to a refusal to deliver the tractor upon demand, and entitled the consignee to recover it by replevin or to sue for its conversion and recover its value," said the Court.

The Case of the Engineer's Assistant



"The progress payment hereinafter specified shall be made upon the engineer's certificate that the work during the preceding month has been done according to the requirements of this contract," clause 11 of a certain contract specified. At the end of the third month Tractor Conn presented himself at the engineer's office and found the assistant in charge.

"Here's your monthly certificate," the assistant announced, signed the typewritten sheet, and flipped it across the desk. Conn presented it to the owner and demanded payment.

"That's all right, but money is mighty scarce right now. Would you mind waiting until the first of next week?" the owner queried.

"That will be satisfactory, but I'll have to pay my help not later than Wednesday," Conn explained. Next week arrived, the owner still failed to pay, and Tractor Conn sued in the New York Courts.

"No engineer's certificate was presented as called for by the contract," was the owner's defense. "An assistant's certificate doesn't fill the bill."

"When the owner accepted the assistant's certificate without making any objection on that ground and promised to pay, he waived the requirements of the contract and it's too late to raise the point now," Conn's lawyer contended. The New York Supreme Court upheld this contention in the case of *McEntyre vs Tucker*, 31 N.Y.S. 672.

The Case of the Disputed Consideration

Tractor Conn had sublet the foundation work of a certain building to Smith, Smith sublet the excavating to Jones, Smith failed to make progress payments as agreed, and Jones stopped work.

"You go ahead and I'll pay you 3c. a yard extra," Conn promised. Jones completed the work and sued Conn for the additional compensation.

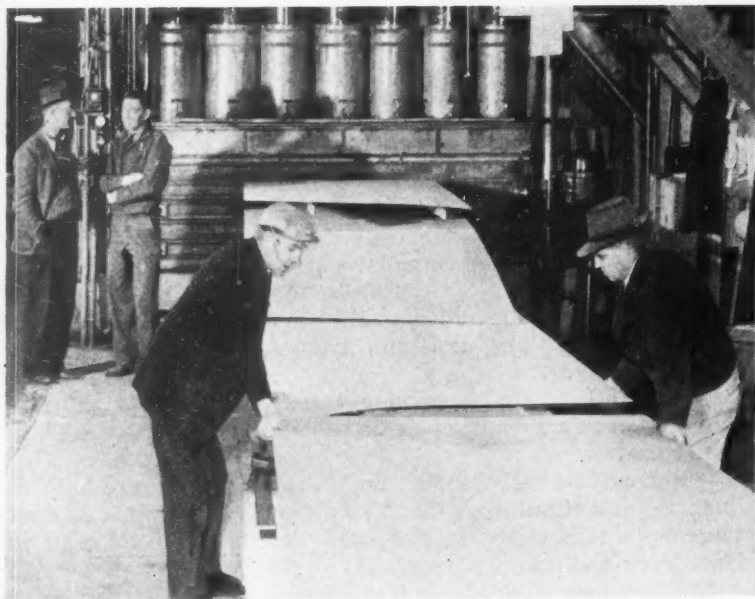
"There was no consideration for my promise, as you were bound to do the work according to your contract with Smith," Conn argued.

"When I agreed to finish the work in spite of Smith's failure to pay as agreed, and you got the benefit of it, that was a sufficient consideration," Jones retorted, and the Minnesota Courts ruled in his favor (in *Grant vs Duluth*, 63 N.W. 1026). The West Virginia Courts have arrived at the same conclusion.

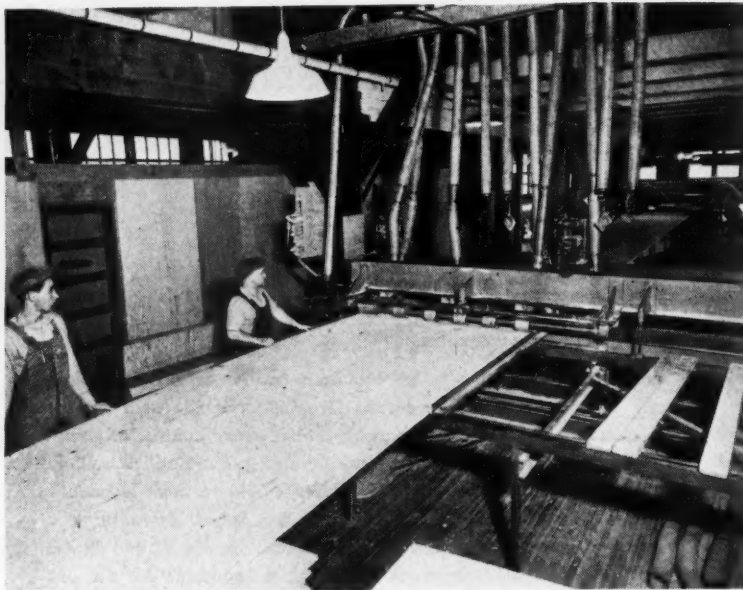


**More Legal Adventures of
Tractor Conn Next Month**

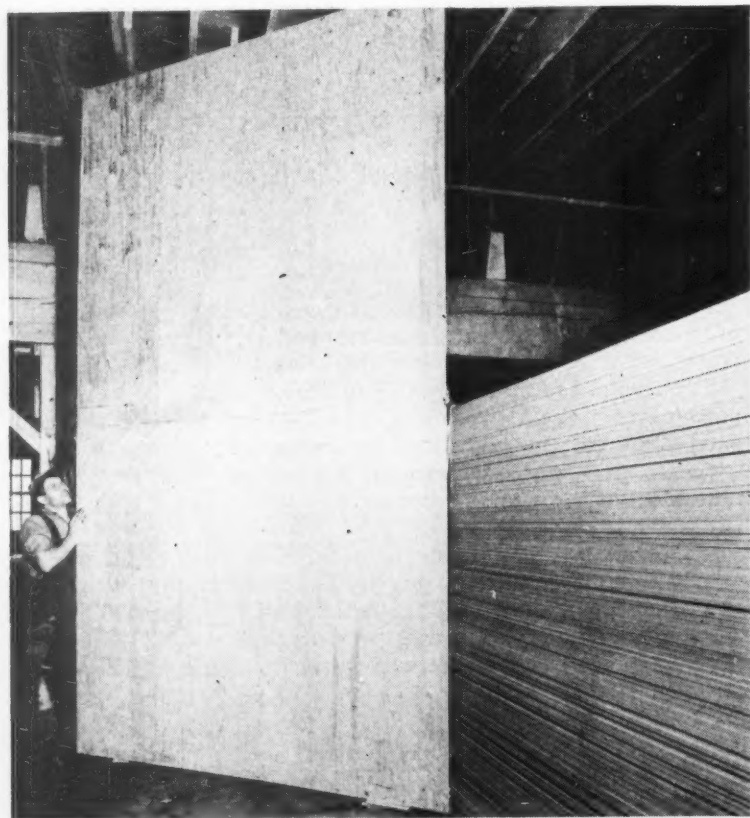
Oversize Plywood Offers New Possibilities for POST-WAR CONSTRUCTION



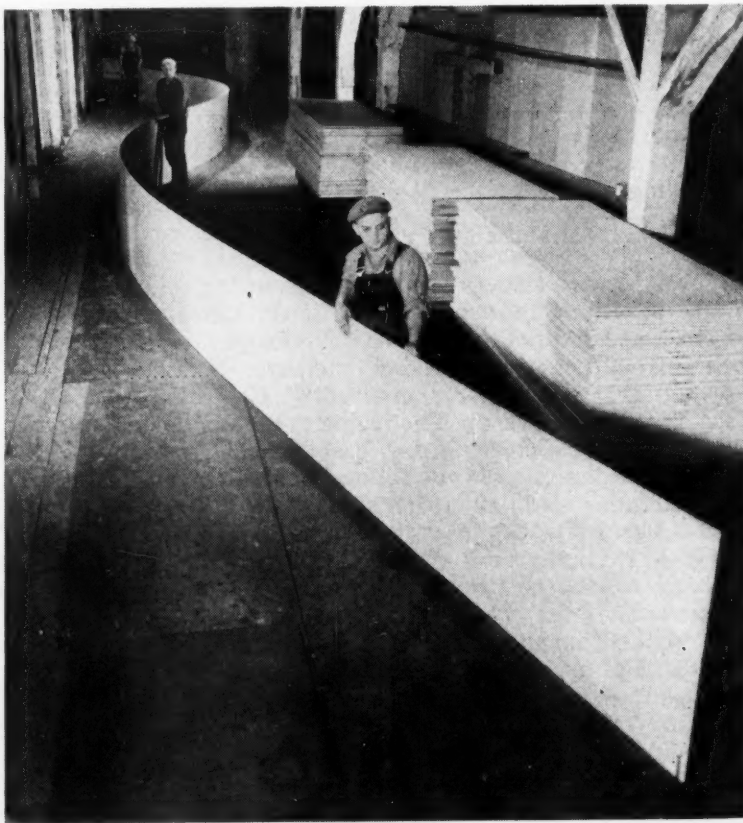
SEGMENTS OF PLYWOOD are joined on conveyor table and moved into four-opening hot press which applies both heat and pressure to set adhesives. Panels joined in this manner are limited only by shipping space. Harbor Plywood Corp. Photo



40-FT. PANEL, scarf-jointed with waterproof phenolic resin glue, is precision trimmed (foreground) and sanded to exact thickness and satin smoothness (background) in straight-line production system. M&M Wood Working Company Photo



FINISHED PANEL, 8 ft. wide and 14 ft. long is ready for use as entire floor for truck or trailer. Jumbo size panels have been made possible by newly protected techniques in scarf-jointing. M&M Wood Working Company Photo



FLEXIBILITY OF PANEL 78 ft. long and 3 ft. wide is demonstrated by bending into S-shape. Although readily bent, this panel when in place contributes considerable rigidity to structure. M&M Wood Working Company Photo

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PREPARING BEVEL for scarf-joint in seven-ply plywood panel, inspector checks accuracy of milled surface. Dark streaks are glue lines between plies; different shading of alternate plies is due to opposite grain direction.
Harbor Plywood Corp. Photo



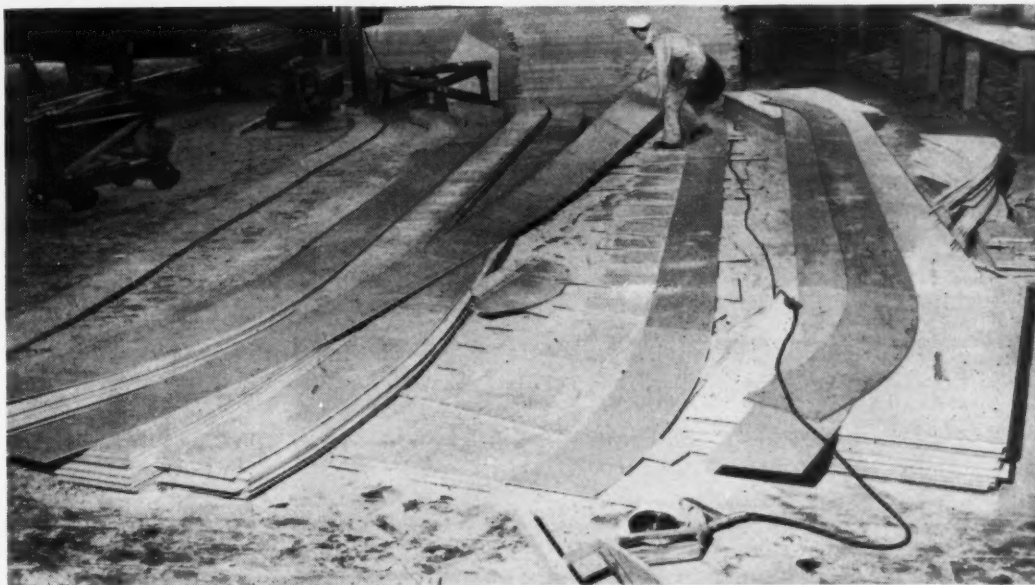
PLYWOOD DECK of tug in Toledo, Ore., plant of C. D. Johnson Lumber Corp., has single seam, barely visible down center. Square cutout for hold has been fitted back into deck.

ONE WAR-TIME BUILDING DEVELOPMENT destined to have a definite effect on future construction methods is the widespread utilization of oversize plywood—both extra long panels and extra thick plates—in various types of military huts, warehouses, hangars, and in small boat construction. The urgent need for speed in construction, the demand for added strength with a minimum of material, and the design of new types of military structures have combined to focus attention on the capabilities of panels as large as 50 ft. in length by 9 ft. in width.

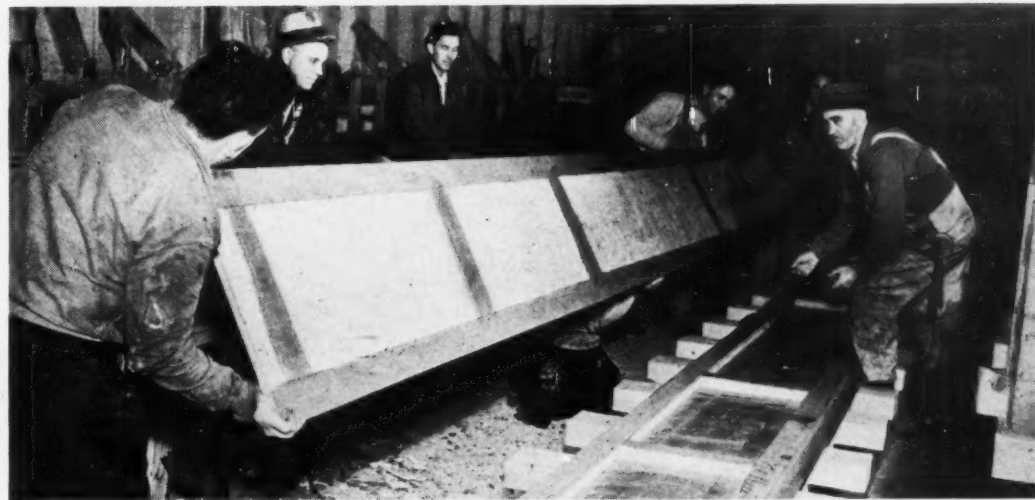
Builders of thousands of arch-roof Army huts and barracks have relied upon the elongated plywood sheets to simplify construction work and save many man-hours of labor. Extreme economies in time have been gained in boat yards by using the giant panels for decks, planking and bulkheads of many types of military craft. Similarly, thick plywood plates have been widely used for gussets and other connectors in large wood-truss structures for manufacturing plants, supply depots, warehouses and shipyards. In boat and barge construction, plywood plates for knees, braces and connecting members have become standard in many yards.

Oversize plywood is not entirely new as both the big sheets and thick panels have been manufactured for several years. However, prior to the war, use of the material was limited both in quantity employed and diversification of its application. With war needs creating, almost overnight, heavy demands for jumbo-size plywood, the manufacturers have perfected their techniques of scarf-jointing standard size panels into long sheets—the length of which is limited only by shipping space—and have increased sharply their production capacity.

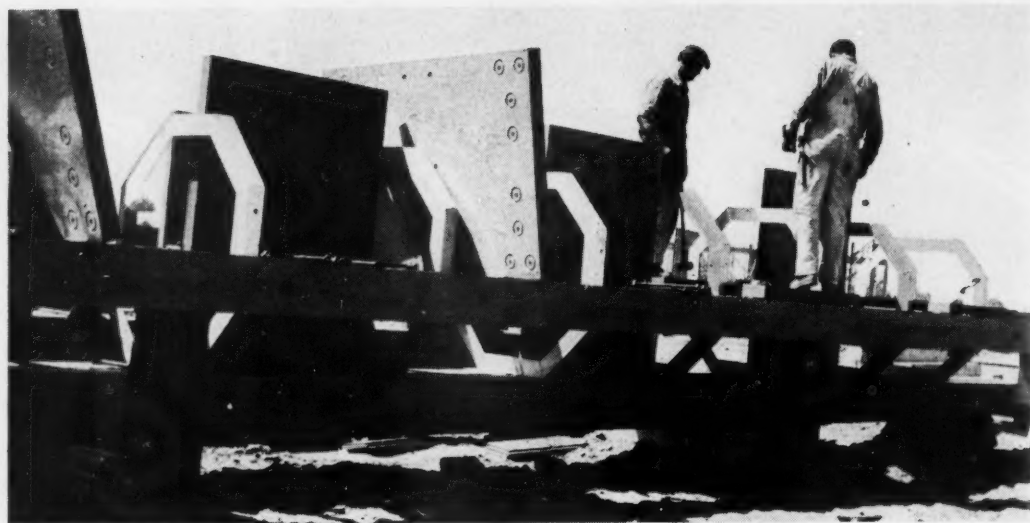
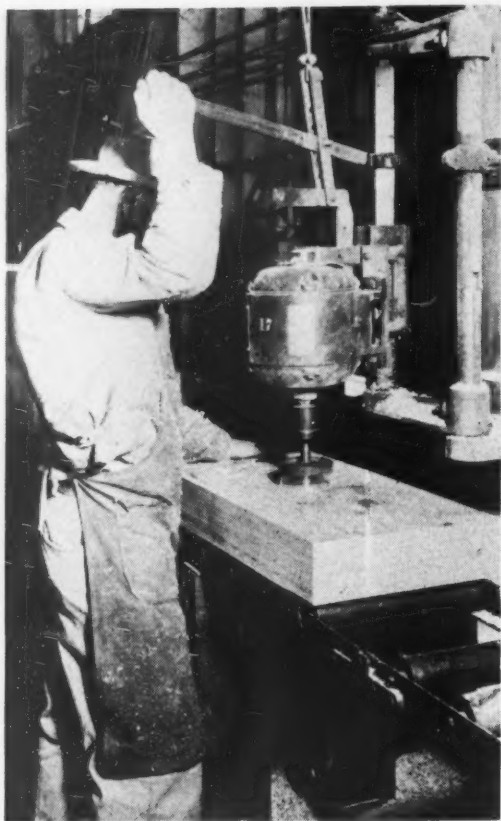
Of the 31 Douglas fir plywood factories, three are now manufacturing long-length panels with a combined capacity



GRAIN OF FACE PLIES in these 32-ft. panels for boat construction runs long way of panel until curve at either end is reached, at which point grain is changed to run at right angles to principal axis. Bending to desired rounded ends is thus simplified.



PLYWOOD I-BEAM, held by men, consists of continuous scarf-jointed panel web and ordinary lumber for flanges. Beam tested to failure at University of Washington failed in flanges.



PLYWOOD GUSSETS $3\frac{1}{2}$ ft. wide, 8 ft. long and 3 in. thick, of 29-ply exterior plywood, served as connectors for 104-ft. high wood posts in pre-war construction of Colonnade of States building at Golden Gate International Exposition.

Harbor Plywood Corp. Photo



MACHINING of 4-in. exterior fir plywood gusset is simple operation using ordinary wood-working tools. Better-fitting timber connectors in split-proof plywood gusset makes sturdier wooden structures.

M&M Wood Working Company Photo



HEAVY GUSSETS made of lumber cores with plywood facing, both sides, go into invasion barges built by Barr Lumber Co. at Santa Ana, Calif. Barges are shipped knocked down.

of about a million square feet a month (surface measure) of the extra large sheets. Virtually all of these sheets are of the exterior (waterproof) type. The firms are M&M Wood Working Co. of Portland, Ore.; Harbor Plywood Corp. of Hoquiam, Wash., and United States Plywood Corp. of Seattle, Wash.

Panels are produced in many thicknesses ranging from $\frac{3}{16}$ to $1\frac{7}{16}$ in. While many of them are the full 50-ft. length, which is the maximum for shipment in large, end-loading box cars, much of the output is in panels from 20 to 35 ft. long. Generally speaking, standard size Douglas fir plywood is 4x8 ft.; some factories produce panels of 10, 12, 14 and 16 ft. without scarf-jointing, the dimension of factory machinery dictating the size of the panel produced.

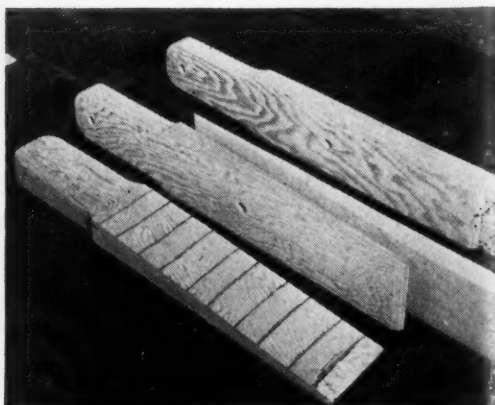
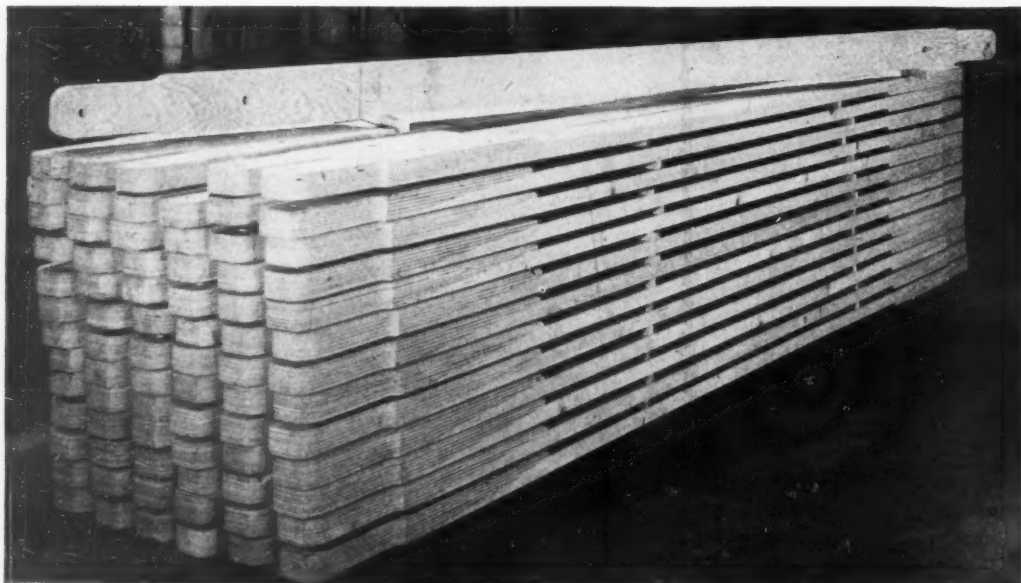
Panels Made for Bending

Dependent upon the ultimate use, the elongated sheets are manufactured with grain of the face plies parallel with either the long or short dimension. Particularly in the thinner sheets, the direction of grain of the faces affects materially the minimum radii to which the panels can be bent. For instance, in using



STRINGERS used in Army ponton bridge construction are composite of ordinary lumber and split-proof plywood ends. Plywood stringer ends (below) in various stages of assembly in preparation of scarf joint.

M&M Wood Working Company Photo



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a long sheet for the curved roof of an Army hut the desired arc is attained more readily if the grain of the two outside plies of a three-ply panel is at right angles to the curve.

Newest advancement in the manufacture of the oversize sheets is the joining of segments so as to facilitate maximum curvature in one or more locations in the panel. This is accomplished by arranging the individual sections (during manufacture) so that in the part of the panel where greatest bending is desired, it will occur at right angles to the grain of the face plies of the panel. The long-length panels manufactured for building a certain design of military boats constitute a notable example. In the center two thirds of the 32-ft. panels, the wood grain of the face plies is parallel with the length of the boat; end sections of the panel—to form the bow and stern of the boats—are joined so the grain in face plies of the plywood is almost at right angles to that in the center of the oversize sheet, as shown by one of the photographs.

Giant panels of this construction
(Continued on page 188)



TRUSSES of moderate-size building utilize plywood fishplates and gussets.

Harbor Plywood Corp. Photo

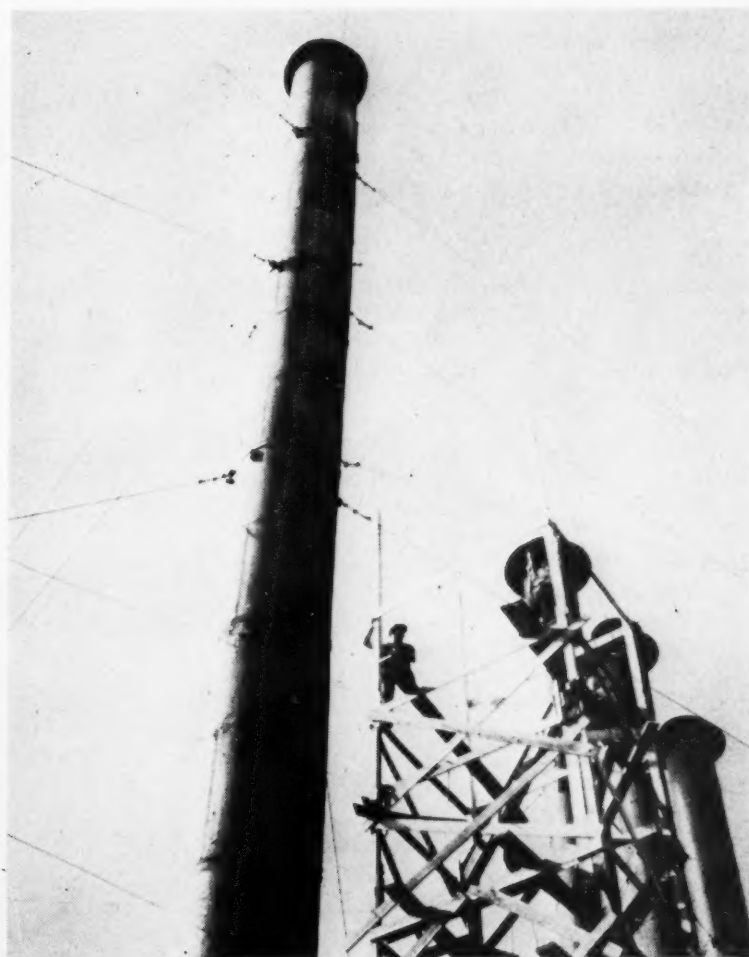
Boiler Stack Erection SPEEDED BY ARC-WELDING

ALL-WELDED CONSTRUCTION cut 33 per cent the time required for building two boiler stacks at a large southern manufacturing plant. Each 150 ft. high and 5 ft. in diameter, they were built in 5-ft. sections weighing approximately 850 lb. each, fabricated from low-carbon, $\frac{1}{4}$ -in. steel sheets.

For the first 100 ft. of installation, two sections were welded together in the shop, then erected as a single unit and welded in position. To simplify handling operations during the last 50 ft., each 5-ft. section was mounted separately. All joints were fillet welded, with approximately 1,200 lb. of $\frac{3}{16}$ -in. Type W-22 electrodes used on both stacks. General Electric 300-amp. motor-driven d.c. welders were used for all shop welding, and 300-amp. engine-driven d.c. welders for all field work. Contractors were E. McLaughlin & Sons, of Richmond, Va.; Arcway Equipment Co. supplied the welding equipment.



FILLET ARC-WELDING joins 5-ft. sections of $\frac{1}{4}$ -in.-thick, low-carbon steel sheets in 150-ft. boiler stack at southern manufacturing plant.



TWO 5-FT. STEEL SECTIONS are welded together in shop and erected as unit to form part of first 100 ft. of boiler stack.

Marine Railway

SPEEDS SHIP REPAIR WORK



A MARINE RAILWAY covering 14½ acres, erected by the Navy at the Commercial Iron Works, Portland, Ore., is scheduled for an important part in the accelerated repair activity of west coast shipyards as the war in the Pacific increases in tempo. These facilities, situated on the banks of the Willamette River, can service vessels up to 400 ft. in length and 3,000 tons dead weight.

Quantities of Materials Used

Construction of the railway required the use of 20,000 lin. ft. of steel rail; 800,000 b.ft. of timbers ranging up to 18 x 18-in. sections and 52-ft. lengths; 2,534 piles as support for the inclined rail system, including underwater portions; 10,000 ft. of 100-lb. per ft., ¾-in. steel chain for hauling cradles, shunts and transfers; and 8,600 ft. of chain for back haul.

How Railway Operates

Twelve pairs of tracks, on which the cradles ride, extend 329 ft. into the river, the outer ends reaching a depth of 40 ft. below mean low tide. Power for hauling ships up the incline is furnished by three electric motors of 200 hp. each. Five speeds are available for the in-haul and three for lowering.

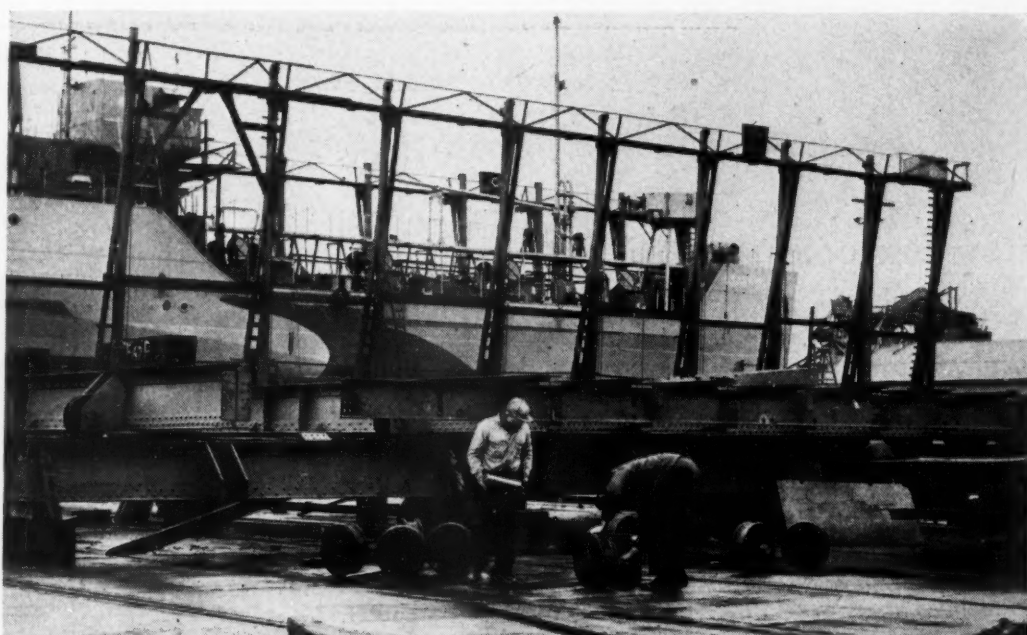
Vessels in need of repair are placed in cradles and hauled up the incline as far as the head wall at which point they are moved on to level transfer tracks in the shunt area. Limit switches automatically stop the cradles as the edge of the head wall is reached. The shunt area is 327.5 ft. wide by 315 ft. deep (from head wall to rear edge of area). Each of the transfer tracks in the shunt area is 275 ft. long and the carriages for the tracks are 36 ft. wide. Most of the repair work is done on the transfer tracks in the shunt area, but a small amount can be performed while vessels are on the cradles at the head wall.

➔
IN SHUNT AREA. cradles are removed from inclined railway to transfer tracks. Vessels of 400-ft. length and 3,000 deadweight tons can be handled by these facilities.



CRADLE READY FOR TRIP down marine railway in Portland, Ore., shipyard, will pick up vessel in need of repairs. Heavy chains for hauling cradles

up incline can be seen; light chains are used for back-haul. Inclined tracks, including under-water portions, are supported by 2,534 piles.



STRUCTURAL STEEL CARRIAGE for shunting vessels to other parts of repair yard is being assem-

bled here. Large naval vessel looms in background. Most repair work is done on transfer tracks.



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Present and Accounted For...A PAGE OF PERSONALITIES



PUBLIC WORKS CONSTRUCTION ADVISORY COMMITTEE will advise with Major General Philip B. Fleming, administrator, Federal Works Agency, on post-war public works needs. Among members are (left to right, seated): F. STUART FITZPATRICK, U.S. Chamber of Commerce, committee secretary; E. LAWRENCE CHANDLER, American Society of Civil Engineers, committee chairman; COL. WILLIAM N. CAREY, who acted as contact between committee and General Fleming until leaving FWA on June 1; (standing) EARL MALLERY, American Municipal Association; MAJOR EDMUND R. PURVES, American Institute of Architects; S. LOGAN KERR, American Society of Mechanical Engineers; H. E. FOREMAN, Associated General Contractors of America; FREDERIC BASS, American Public Works Association; J. W. FOLLIN, Producers' Council, Inc.; B. E. CRIHFIELD, alternate for Frank Bain, Council of State Governments; and R. J. GRAY, Building and Construction Trades Department, American Federation of Labor. Not shown are Paul Betters, U.S. Conference of Mayors, and Hal H. Hale, American Association of State Highway Officials.



NEW ASSISTANT EDITOR OF "Construction Methods" is DONALD D. KING, former technical editor of "Aviation Engineer Notes" for Army Air Forces at Washington, D. C. Mr. King, who holds degree of B.S. in C.E. from Iowa State College, served for 13 years with American Society of Civil Engineers as assistant editor of "Civil Engineering." He has also been associated with U.S. Engineer Office in Milwaukee, Wis., and Truscon Steel Co.



ELECTED PRESIDENT of New York State Highway Chapter, Inc., Associated General Contractors of America, is WILLIAM H. PECKHAM, of White Plains. He is president of Cold Mix, Inc.; Catskill Mountain Stone Corp.; Westchester Asphalt Distributing Corp.; and Peckham Road Corp.



NEW SECRETARY of American Society of Civil Engineers is COL. WILLIAM N. CAREY, former consulting engineer of St. Paul, Minn. Until June 1 he was on active military duty serving as chief engineer of Federal Works Agency. Colonel Carey succeeds the late George T. Seabury as A.S.C.E. secretary.

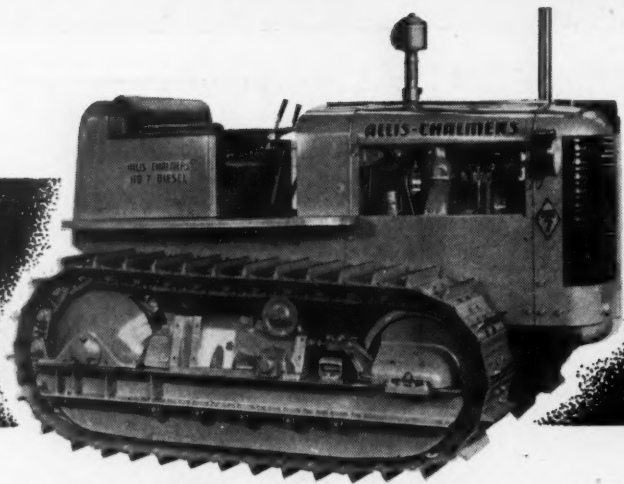
Page 97

UNDERWATER SURVEY AND SALVAGE will be handled by newly organized firm of J. I. Tooker & Sons, consultants, with headquarters on Staten Island, New York. CAPT. TOOKER (below), formerly superintendent of marine salvage for Merritt-Chapman & Scott Corp., was in charge of salvage for sunken French liner "Normandie."

ELECTED CHAIRMAN of newly organized Construction Machinery Manufacturers' Industry Advisory Committee of Office of Price Administration is W. B. GREENE (below), vice-president and treasurer, Barber-Greene Co., Aurora, Ill. Committee was appointed by OPA to serve as clearing house for industry, to help crystallize industry pricing problems.

HIGHWAY CONTRACTORS' DIVISION of American Road Builders' Association is headed by BURTON F. MILLER (below) as managing director. Mr. Miller has been with A.R.B.A. for 9 years and since 1940 has acted as executive assistant to Charles M. Upham, engineer-director.





HD-7's and

MEAN ECONOMY

Size up the job, then apply the right tractor power. In many cases smaller Diesels will handle the work as efficiently as larger models, at considerable savings.

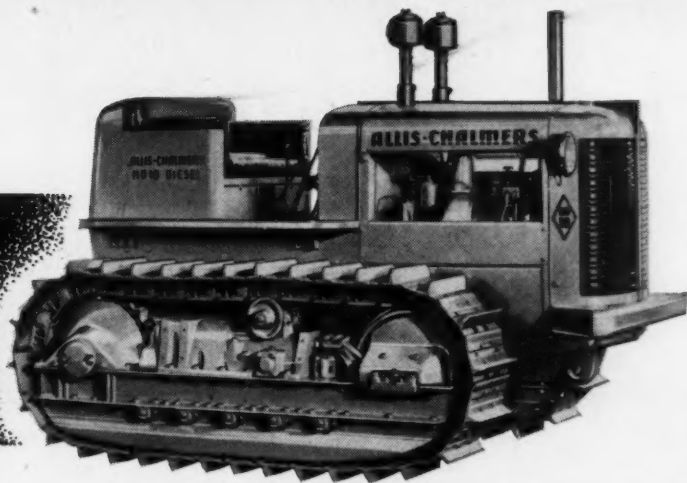
Either the Allis-Chalmers HD-7 or HD-10 may be used for bulldozing, pulling graders, clearing or moving heavy machinery, depending on conditions . . . also with suitable 2- or 4-wheel scrapers or for pushing larger scrapers.

Use power to fit the job. Get your money's worth from your tractors. A well-balanced line of HD-7's, HD-10's and HD-14's is the answer to lower cost construction. Let your Allis-Chalmers dealer help you power your job right!



- 1 Medium capacity 4-wheel scrapers are easily handled by the HD-10.
- 2 Plenty of digging power — HD-7 handled all grading on this cut.
- 3 Big stumps and trees are quickly cleared with the HD-7.
- 4 Here is economy. Work both ends of your HD-7.

ed. **HD-10's**



ON MANY JOBS



ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U.S.A.



ONE-TRIP PROCESSING by self-powered stabilizer leaves uniform soil-cement mixture in loose, fluffed condition for full-depth compaction by tamping feet of sheepfoot roller. Processing operations performed by self-contained machine involve pulverizing, blending, spraying and thorough mixing by twin pug-mill mixer. Added water applied by spray bars of stabilizer is drawn from tank truck pushed ahead of machine.

Single-Pass Stabilizing Machine

IMPROVES PROCESSING OF SOIL ROADS

DEVELOPED AS A POST-WAR PRODUCT to meet specific needs, a self-contained stabilizing machine for complete, accurately controlled processing of soil roads has obtained notably creditable results on two Texas jobs where binder admixtures of different types were incorporated in the soil mixtures. One project added portland cement to the soil, and the other coated the soil particles with RC-2 cutback asphalt. Hansen & Galbreth, contractors, Cleburne, Tex., built the soil-

cement project for the state highway department, using sandy loam material obtainable at the site. The soil-asphalt job was constructed with sandy loam containing a large percentage of fines by state highway forces under the direction of M. E. Savage, resident engineer at Corsicana.

Several functions are combined in the single-pass stabilizer, used on these jobs, to make it a complete processing unit. As built by the Harnischfeger Corp., the self-propelled machine performs the operations of a rotary tiller, liquid spray-bar distributor, and twin pug-mill mixer. A special feature of the mechanical design causes the sprayed liquid to be applied to the soil particles while the particles are dispersed in the air. Other features provide accurate control of processing to precise grade and thorough mixing to produce uniform distribution of soil particles throughout the processed mass, which is left in a fluffed condition susceptible to effective compacting.

By virtue of the series of integrated processing operations (pulverizing, blend-

(Continued on page 172)



← **SOIL-ASPHALT MIXTURE** of uniform gradation and binder content is completely processed and struck off at proper depth for compaction on 8-ft. strip of Texas road in one trip of single-pass stabilizer. Two individually controlled spray bars in stabilizer provide flexibility in application of liquids.

STEADY JOBS

and EQUIPMENT BUYING

SUSTAINED employment is not an attainable goal unless we can moderate the erratic fluctuations which have characterized the markets for producers' equipment in past periods.

In the 35th editorial of this series, "Sustained Construction Activity", it was pointed out that there is no specific that can cure our economy of its "boom-or-bust" proclivities. Rejecting the notion that the construction industry could be so managed as to stabilize business as a whole, that editorial stressed the important contribution it could make to that end, and suggested several practical expedients through which construction activity might be regularized.

Producers' equipment represents an area of production quite as broad and diverse as construction, though smaller in aggregate value. The classification embraces all types of durable equipment bought and used for profit—locomotives, motor trucks, electric generators, conveyors, machine tools, farm implements, and so on down to surgical instruments and dentists' drills.

Although the output of such equipment averages over a long period only 5 or 6 per cent of the nation's total output, it resembles construction in its extraordinary ups and downs. While its component items differ widely in the amplitude and violence of their fluctuations, the class as a whole is one of the most unstable sectors of the economy, making therefore a quite disproportionate contribution to the cyclical swings of total production and employment. From 1929 to 1932, for example, the decline in the output of producers' equipment (at constant prices) was 65-70 per cent, in contrast to a decline of 25-30 per cent in the national output exclusive of such equipment and construction.

A more recent example of the volatility of demand in this field may be found in the movement of a monthly index of orders for industrial equipment, which rose from 92 in the spring of 1936 to 160 in the spring of 1937, falling thence to 65 in the summer of 1938 and rising again to 142 in the fall of 1939. Such fantastic oscillations present an obvious and inescapable challenge to all concerned with economic stabilization.

Not only are these fluctuations bad for the economy; they represent demonstrably bad buying policy on the part of the purchasers of equipment. Peaks in demand come characteristically just before a business depression (1919, 1929, and 1937, for example)

when machinery costs the most to buy and install and when it has the lowest expectancy of continuous use. At exactly the wrong moment everyone wants to buy. In the depression itself, on the other hand, with costs down, and with nowhere for the economy to go but up, equipment is a drug on the market. No one wants it when it is cheap and has the greatest prospect for steady employment. Here is a behavior pattern so profoundly irrational there must be hope for its correction.

There is an inveterate tendency for business management to forecast the future simply by projecting the trends of immediate past. Although it is axiomatic that the chance for an extended period of further prosperity is inversely related to the duration of the prosperity already experienced, this truism is generally ignored. The longer the boom has run, the more certain is business management that it will continue indefinitely. Convinced at last by "actual experience" that prosperity is here to stay, executives give the green light to commitments for expansion and modernization previously deferred in a skeptical attitude of "wait and see". The result, so often repeated in our economic history, is an explosive burst of demand for equipment coincident with, and contributing to, the final spasm of a boom. Witness the phenomenal rise in industrial equipment orders during 1928 and the spring of 1929.

The same prophetic illusion works in reverse during a depression. Recent experience is projected into the future. Although the mathematical probability of an imminent and prolonged period of prosperity increases directly with the duration of a depression, it finds little reflection in business decisions. Timidity and caution are the order of the day.

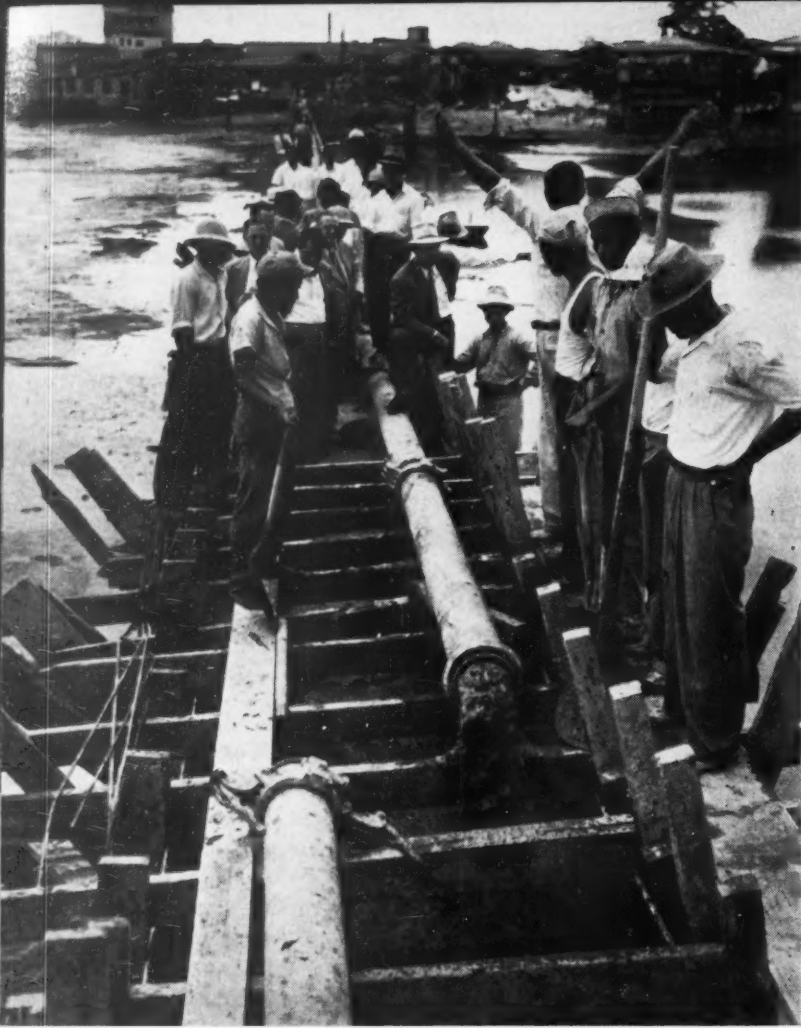
Compounding the errors caused by faulty perspective, are a number of influences which make it extremely difficult for individual enterprises to follow a policy geared to sensible long-term considerations. In a boom, particularly in its climactic phase, most producers find their order books crowded beyond the potential of their current capacities and are faced with the alternatives of expanding or losing trade to competitors. In depression the situation is reversed, and producers with unused facilities find it difficult to justify increases in their capital charges.

An even more controlling factor in many cases is the availability of funds. This is especially important

(Continued on page 104)

Fast Work From Two Ends

Completes Seawall in Short Time

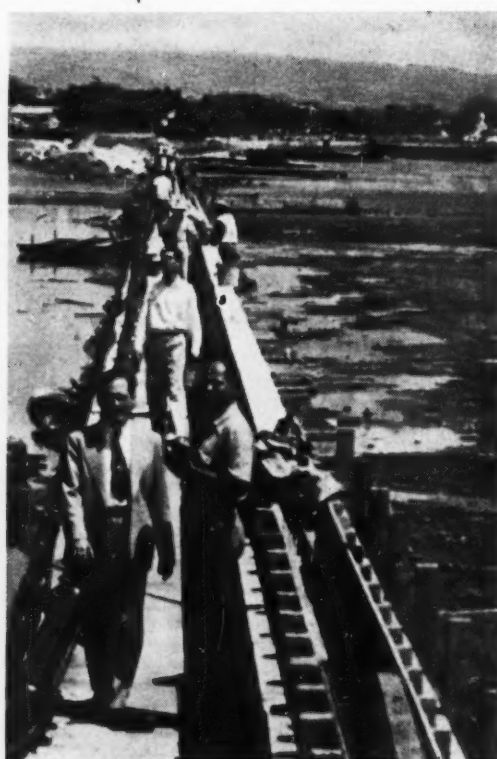
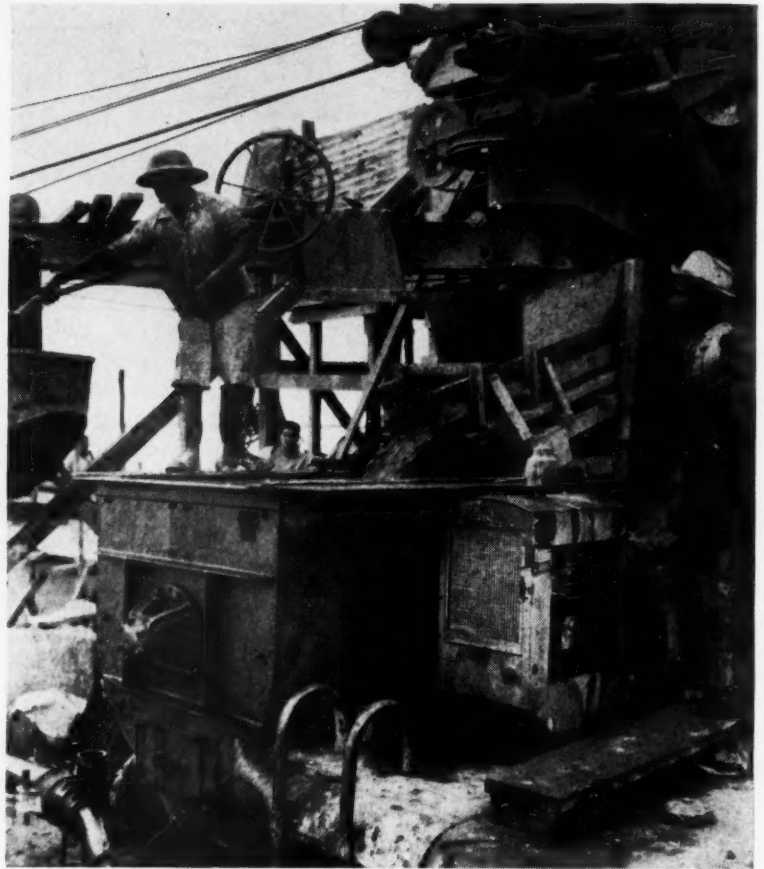


→
PLASTIC CONCRETE pumped through pipe line from plant on shore is deposited in forms for top lift of Panama seawall.

MIXED CONCRETE is discharged into hopper of Pumpcrete at one end of seawall for delivery through pipe line to forms.

DUMP TRUCK (below) backing over previously completed base transports 1,725-cu. yd. load to section being concreted during 3-hr. interval between tides.

↓
ADVANCING in foreground is **FRANCISCO MORALES**, contractor and engineer, followed by his son, **FRANCISCO MORALES, JR.**, project engineer.



BY BUILDING OUTWARD from the shores at both ends and speeding form erection and concrete delivery during brief periods of low tide, Francisco Morales, contractor and engineer, completed a concrete gravity-type seawall 1,532 ft. long across part of Panama Bay, on the Pacific side of the Republic of Panama, in 99 days, beating a 130-day contract time limit by a full month. The wall, curved on the sea face to deflect waves, has a base width on rock of 11.8 ft., a height ranging from about 14.75 to 19 ft., and a top width of 4.9 ft. Concrete containing Lone Star high-early-strength cement and Pozzolith admixture (for greater plasticity) was pumped from one shore by pipe line and was delivered by truck from the other. Wall masonry is cyclopean, one-man stone being placed in all the concrete to make up about 10 percent of the mass.

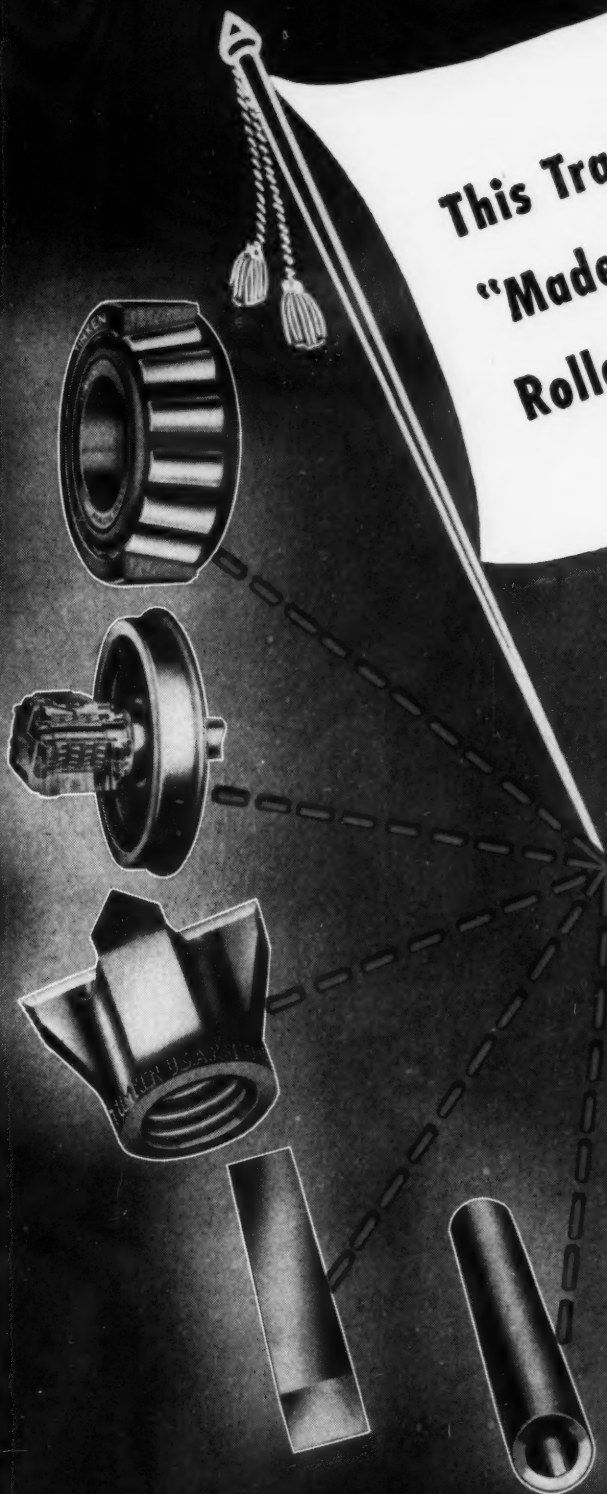
Construction of the wall was carried up in three lifts. For the base lift, 2 to 3 ft. of muck had to be removed by clamshell or by hand to uncover hard rock. As only 3

(Continued on page 170)

TIMKEN

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Wherever you find it—on tapered roller bearings; alloy steel; seamless steel tubing; or rock drilling bits; it identifies a *genuine* Timken product with all that this implies—superior quality, performance and endurance.

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COMPANY, CANTON 6, OHIO

for small concerns. Typically such firms enjoy but limited credit, and with no ready access to the securities markets, their capital expenditures depend primarily on earnings. When they are making money, they can afford to buy equipment; when they are losing, they largely disappear from the equipment market. Even great enterprises, though less dependent on earnings as a source of capital financing, are profoundly influenced by the volume of internal funds available for the purpose, a volume as a rule far greater in prosperity than in depression. Moreover, it is usually easier in good times to obtain outside funds through the sale of stock or by borrowing, since in bad times bankers, underwriters, and investors are susceptible to the same timidity and caution that afflict business management generally.

We are dealing here with a combination of psychological, physical, and financial forces which conspire to aggravate the instability of demand for capital equipment. What can be done to reduce this instability and thus to bring equipment purchasing into a more sensible and constructive pattern?

There is no panacea, no royal road to the solution. The problem has been with us since the beginning of the industrial economy. It is complex and difficult. It is not, however, wholly intractable. We may reasonably hope that industry will, through intelligent effort, make substantial progress toward a satisfactory solution. The industrial equipment field is one in which government, except for war periods, has exerted little direct control. The best insurance against the institution of government measures is to so conduct activities in the equipment field that no justification for government interposition can be made.

☆ ☆ ☆

1. The first and most important step is for industry itself to reconsider its heretofore haphazard and opportunistic policy in the purchase of equipment, substituting so far as possible a regularized, long-range programming of expenditure that will resist both the excited long-buying of booms and the equally disturbing underbuying of depressions. Such long-range programming is particularly appropriate and advantageous for large enterprises in established industries such as railroads, electric power, steel, automobiles, and the like, but it makes sense much more generally.

Once executives come to realize that a reasonably stable equipment program contributes not only to the welfare of the economy but also to the lowering of their long-run equipment costs, the opportunity to combine a public service with private advantage should induce them to recast their policies accordingly.

There is an even more compelling reason for purchasers of industrial equipment to do everything possible to regularize their demands. Some concerns unquestionably will find themselves in a postwar position where speedy delivery of needed equipment, even though it involves the payment of premium prices, will seem to be justified. But there is no system of accounting that can show it to be a profitable transaction to promote an equipment industry boom that runs a brief

course only to collapse when the backlog of deferred maintenance and development has been satisfied. That, historically, has been the trigger which trips the door to the depression phase of the business cycle. No immediate advantage can compensate for the contagious paralysis that infects all business enterprise when major layoffs occur in any major segment. No precautionary measures, self-imposed by business, can be regarded as unduly severe if they can prevent this devastating blight.

2. Financial agencies can and should play a responsible role in regularizing equipment demand. Funds for the purchase of producers' equipment should be offered boldly and at low interest during depression periods, and should progressively tighten as a boom market bids up the price of purchase and installation. Banks and financial houses have excellent facilities for gathering and interpreting market and general economic information. It is good business for them, and for the national economy, to exercise their accepted discretions in a manner that will help to promote economic stability.

3. There now is almost universal recognition of the need for a thorough-going revision of our corporate tax structure to the end that effective incentives may be offered for private capital investment. The possibility of including provisions which would offer special tax concessions to equipment investments made in depression periods is worthy of intensive exploration.

☆ ☆ ☆

The fundamental problem here is educational. If all business enterprises in a position to do so were to regularize their equipment expenditures, it would have a tremendously beneficial effect. True, it would accomplish no miracles. For many concerns it is not feasible to schedule equipment buying over a long period. Even those who do schedule it are likely in practice to attain only a relative stability. It must be acknowledged, moreover, that few programs could withstand indefinitely a very deep and prolonged depression such as we had in the thirties. Nevertheless the adoption of stabilization policies where feasible would make a signal contribution both to the restraint of booms and to the mitigation of depressions. Here is something industry can do for itself.

It is easy to disparage such remedies for economic instability as are here proposed on the ground that they are partial only. However, joined with others also partial, they can achieve in combination a solid progress toward the goal of sustained high level employment—progress that is unattainable through economic cure-alls. The road suggested is a slow road, and difficult, but it leads upward.



President, McGraw-Hill Publishing Co., Inc.

THIS IS THE 37TH OF A SERIES

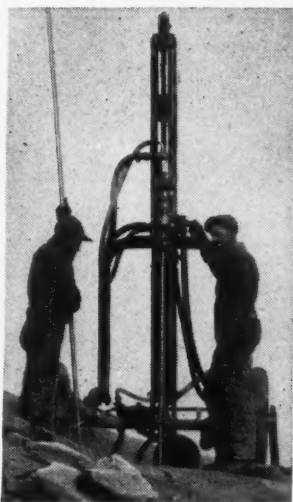
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Drill . . . fast, powerful,
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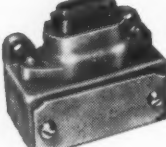
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Stand Rough Handling and
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Capacities from 5 to
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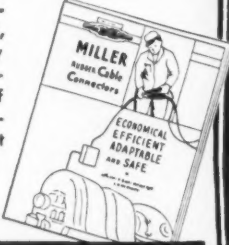


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Carried in Stock in Standard
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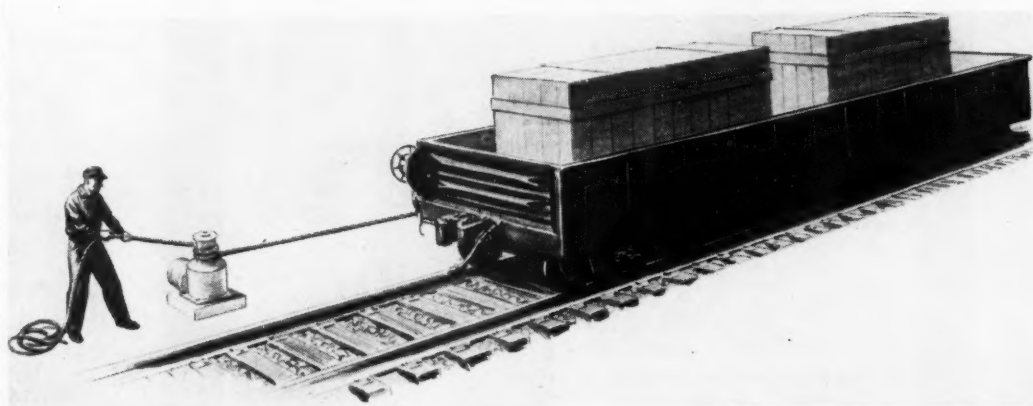
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4245 Clayton Avenue
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CONSTRUCTION EQUIPMENT NEWS

JULY, 1945 REVIEW of Construction Machinery and Materials

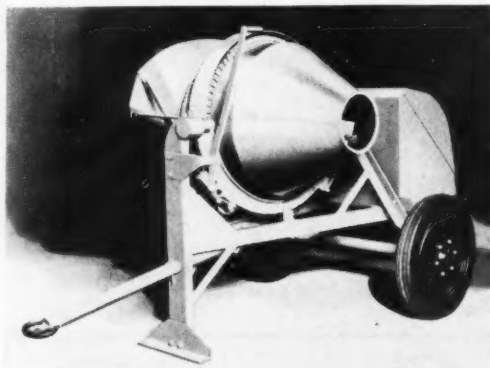


CAR PULLER, called Lo-Hed, is husky low maintenance machine which has uses ranging from moving railroad cars of all types to pulling skids, powering boat and airplane runways, dragging logs, bending pipe and numerous other backbreaking operations. Barrel, gear box and motor are integrated in single streamlined unit. Starting line

pull is 5,000 lb., using a single line or more with various block combinations. This mechanical "one-man gang" replaces car spotting crew as one unskilled laborer can operate it. Speeds loading and unloading of cars, reduces demurrage and eliminates shifting charges.—**American Engineering Co.**, 15th & Locust Sts., Philadelphia 2, Pa.

★ ★ ★

ONE-HALF BAG CONCRETE MIXER, tilting type, is equipped with air-cooled engine, high tension magneto and simple rope starter. Power is transmitted to drum drive shaft by a roller chain run-



ning at low speed on machine cut sprockets, all inclosed in engine house which has a hinged cover opening like trunk of an automobile and making all parts of engine accessible.—**T. L. Smith Co.**, 2835 N. 32nd St., Milwaukee, Wis.

NEW PICKLING AGENT, named Troxide, for removing rust, scale, tarnish and incrustations of cement and lime from metals, is a dry, inert compound, non-eruptive, non-inflammable and is said to present none of the occupational hazards common to acids heretofore used in pickling. Claimed to throw off no "acid mist" or other toxic fumes which are pungent, corrosive and harmful to workmen and machinery. Tests have proved, according to its manufacturers, that Troxide attacks the scale, not the good metal and the surfaces are left smooth, clean and bright, thus materially reducing hazards of over-pickling. May be used hot or cold. Packed in wooden barrels. Foster D. Snell, Inc., Brooklyn, N. Y., consulting chemists, collaborated with the Johnson-March Corp. Laboratories, New York City, in the development of Troxide.—**Waverly Petroleum Products Co.**, Drexel Bldg., Philadelphia 6, Pa.



SMOOTH, ACCURATE WORK... *A "Cinch" with Adams*

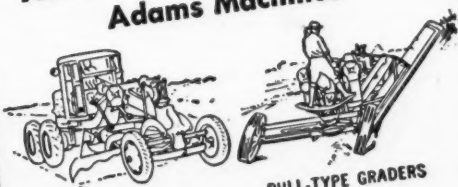
● Sound engineering design and rugged mechanical construction are absolutely essential to smooth, accurate blading and scarifying.

These important, necessary characteristics are inherent in every Adams Motor Grader: (1) *Balanced Weight Distribution*, assuring always-ample pressures for forcing blade and scarifier into hard materials; (2) *Positive-Acting Mechanical Controls*, providing fast, accurate blade and scarifier adjustments; (3) *Built-in Rigidity* and absence of lost motion in controls hold blade and scarifier solidly in place.

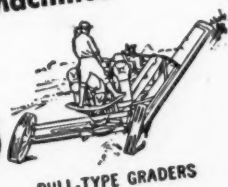
Let your near-by Adams dealer show you how these, and many other outstanding Adams features, will materially speed grading operations and reduce operating costs for you.



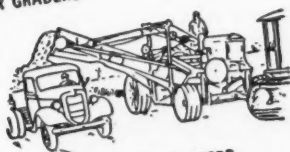
Ask Your Dealer About These
Adams Machines



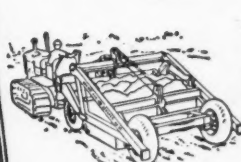
MOTOR GRADERS



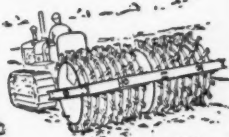
PULL-TYPE GRADERS



ELEVATING GRADERS



HAULING SCRAPERS



TAMPING ROLLERS



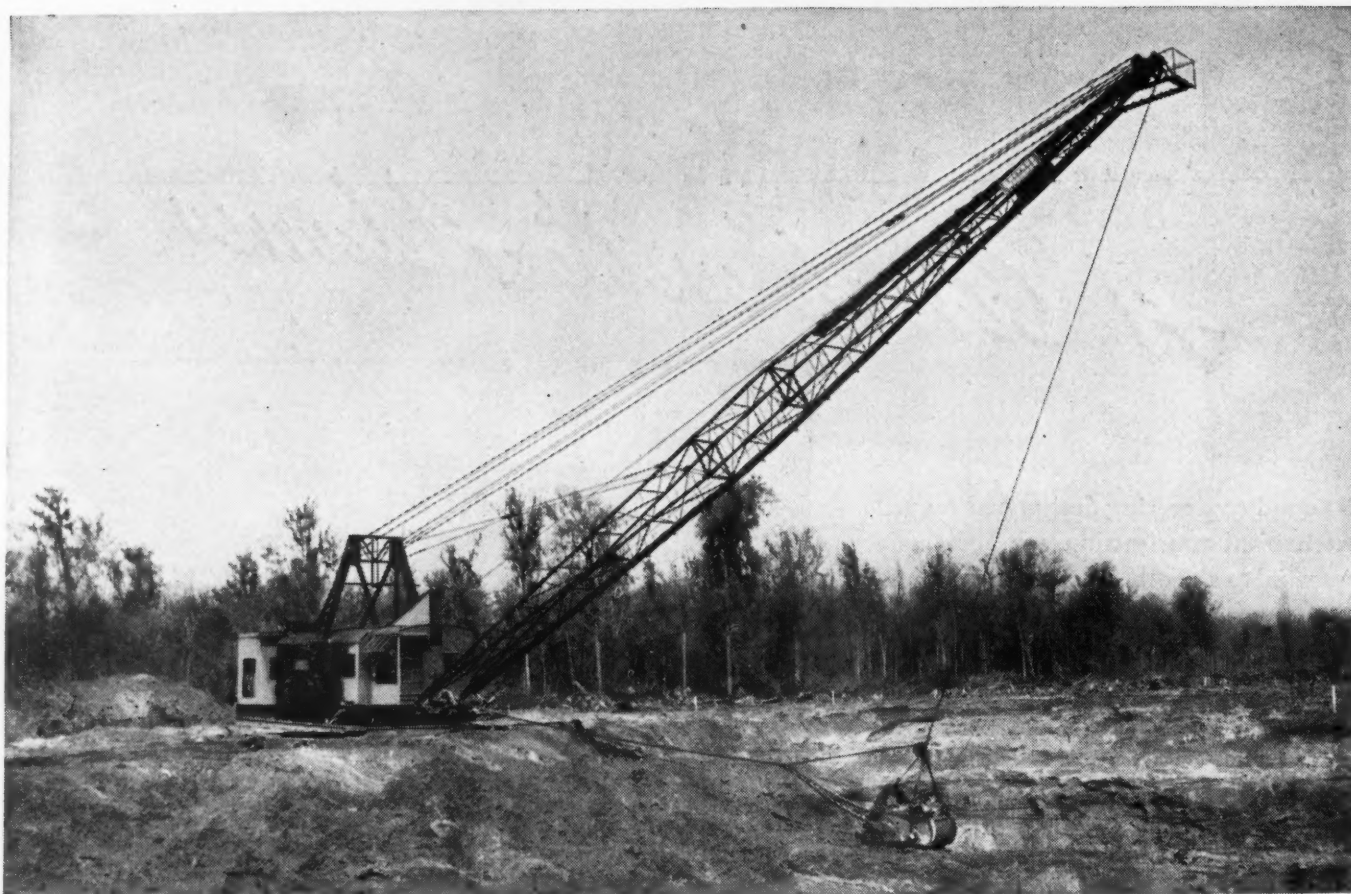
J. D. ADAMS MANUFACTURING CO.

INDIANAPOLIS, INDIANA

Sales and Service Throughout the World

ADAMS

ROAD-BUILDING AND EARTH-MOVING EQUIPMENT



Good for **MILLIONS** of Yards



Available with
booms up to 250
ft.; buckets up to
50 cu. yards.

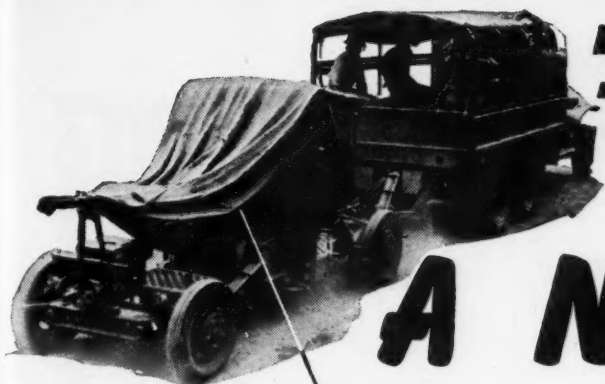
Sold by

BUCYRUS - ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN.

Smooth walking action and simple durable machinery —these are big reasons why you can count on Bucyrus-Monighan walking draglines for fast dependable service throughout a "life" of millions of yards of output.

Over rough ground or soft, Bucyrus-Monighans walk smoothly, cushioning down their weight evenly with each step, without the bumps or jars that cause destructive stresses. That's why their walking action lasts . . . why they step out safely, positively, and gently even after moving 15 or 20 million cubic yards. Their "years ahead" digging speed and smoothness lasts, too, because machinery design has the simplicity that keeps maintenance requirements low, digging efficiency high through many years of hard service.

3M45



The War Showed the World A NEW CANVAS

Picture a more gruelling test for cotton duck, first cousin to gun cotton in burning qualities; subject to the same natural deterioration as any organic matter in the elements; victim of the virile mildew fungus.

Yet that same cotton duck has gone to war. Resisted every incendiary that the enemy could throw over; every deteriorating influence that the swamps of Guadalcanal, the deserts of North Africa, the bleak winds of Iceland and Russia, and the salt spray and tropical heat and rains of the South Pacific could muster.

But, of course, that cotton duck was FIRE CHIEF-treated Canvas — the original fire-, water-, weather- and mildew-resistant HOOPERWOOD "Engineered Canvas."

What does this triumph of "Canvas Engineering" hold for the post-war world? Many things, among which are: construction windbreaks that hot rivets or welding torches won't ignite . . . awnings that won't burn, mildew and rot . . . truck covers outlasting their predecessors several times over . . . ships' hatch covers and lifeboat covers that present no fire hazard . . . and many other superior canvas products.

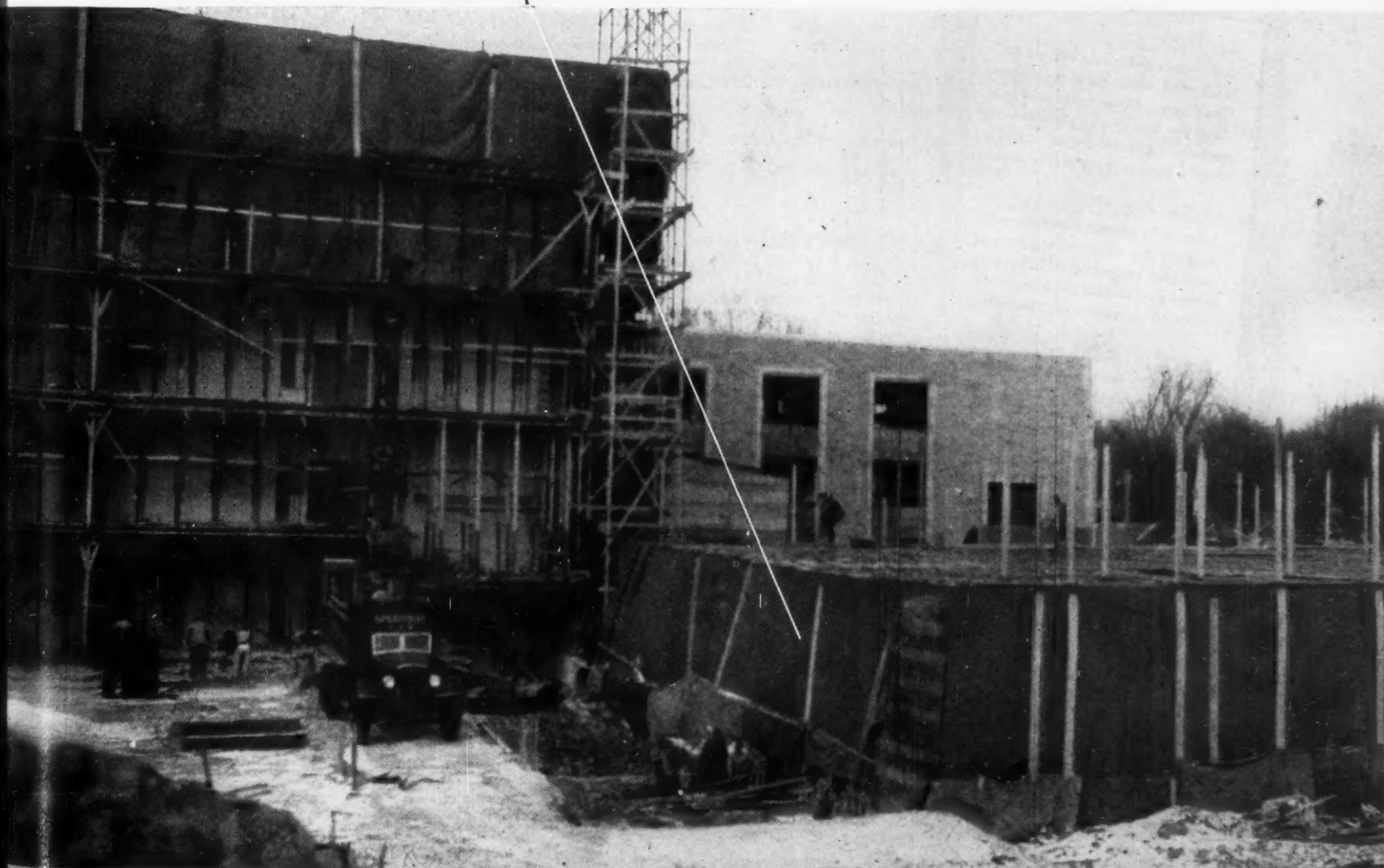
If you are interested, write for new bulletin, "War Proved for Post-War Service."

WM. E. HOOPER & SONS CO.

New York **PHILADELPHIA** Chicago

Mills: **WOODBERRY, BALTIMORE, MD.**

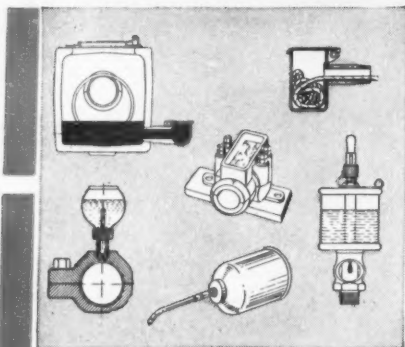
Since 1800 (through six wars) the HOOPER name has symbolized highest quality in Cotton Duck and other Heavy Cotton Fabrics, Paper Mill Dryer Felts, Filter Cloth, Rope, Sash Cord.



Fire-Chief Finished (PATENTED)

HOOPERWOOD COTTON DUCK

LUBRIPLATE Nos. 1-2-3-4



FOR HIGHER SPEEDS

Probably the severest tests for high speed lubricants occur in the textile and wood-working industries. These industries have definitely proven that machines can be run safely at higher speeds with LUBRIPLATE lubricants. With these revolutionary lubricants, there is far less replacement of parts. Burned-out bearings are held down to an unprecedented minimum. LUBRIPLATE lubricants in various densities are available for all applications.

LUBRIPLATE

Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

LUBRIPLATE

Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

LUBRIPLATE

Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.

Write for a booklet, "The LUBRIPLATE Film", written especially for your industry.

LUBRIPLATE

FISKE BROTHERS REFINING CO.

NEWARK 5, N. J.
TOLEDO 3, OHIO

OUR 75TH YEAR
1870-1945



DEALERS FROM COAST TO COAST



WET BELT SURFACER. designed to save time in the jobbing machine shop, tool rooms, repair shops and in laboratories and experimental departments, permits line contact and platen grinding and polishing without heat and dust (dry machine disadvantages) and consequent operator complaints and costly delays, the dust being injurious to health and equipment and the heat generated causing distortion, warping, checking and cracking. Cool operation of unit speeds

cutting, prevents loading of the belt and eliminates burring operations. Equipped with a 4-in. belt which works a considerable area, with a 1½-hp. motor which supplies ample power, and with a self-contained recirculating system and individual motorized pump.—Porter-Cable Machine Co., Syracuse 8, N. Y.

★ ★ ★

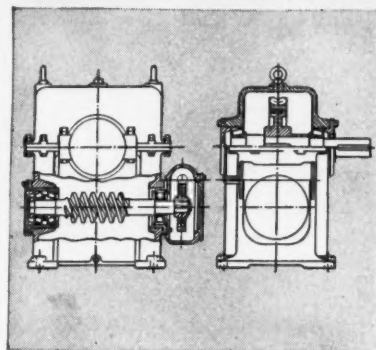
SINGLE PASS SOIL STABILIZER for use in building of low-cost all-weather roads combines in one operation all necessary functions in soil preparation. Tests made under varied conditions and in different parts of the country are said to have been received with enthusiasm by highway authorities as the machine promises efficient, low-cost processing of native soils for the construction of base courses and light traffic roads. Results of these tests are available to interested road builders.—Harnischfeger Corp., Milwaukee 14, Wis.

★ ★ ★

EXPANSIVE BIT for use in hand braces to cut holes in wood has a center lip which cuts away the core at the center of the hole and extends back to form a clamp which firmly holds the adjustable blade at the diameter set. A screw locks clamp tight. Once locked in the positive wedge-lock V-groove, the cutter remains securely in place. Improved, diamond-shaped screw point gives longer life by lessening chance of breakage. Lead screw is threaded finer than usual for this type of tool, helping to pull the bit through the wood and requiring only light pressure to cut quickly and cleanly because the lead screw is continuously and firmly engaged while adjustable blade is cutting. Threads differ on the two models to correspond to the capacity of each tool. Large, open throat keeps cutters clean of chips. Equipped with two cutting blades, long and short. Another feature: removable center lip or cutter which also serves as a clamp to hold the blade. Two models available: No. 200-B is 7 in. long and cuts holes from ¾ to 1¼ in.; No. 201-B cuts all diameters from 1½ to 3½ in. and is 8½ in. long. Both tools equipped with standard square bit stock shank.—Bruno Tools, 9330 Santa Monica Blvd., Beverly Hills, Calif.



LUBRIPLATE No. 8



FOR HEAVY GOING

LUBRIPLATE No. 8 possesses an extremely high film strength and is just the correct density for the general run of enclosed gears (speed reducers). It is especially suitable for worm gears and other types carrying heavy loads. Typical of all LUBRIPLATE lubricants, No. 8 has exceptionally long life.

R FOR YOUR MACHINERY

No. 3—Ideal for general oil type lubrication. Ring oiled bearings, wick feeds, sight feeds and bottle oilers.

No. 8—Because of its high film strength and long life reflects outstanding performance in most types of enclosed gears (speed reducers).

No. 107—One of the most popular grease type products for general application by pressure gun or cups.

No. 70—For a wide range of grease applications, especially at temperatures above 200 degrees F.

No. 130-AA—Known nationwide as the superior lubricant for open gears, heavy duty bearings, wire rope, etc.

BALL BEARING—This is the LUBRIPLATE lubricant that has achieved wide acclaim for use in the general run of ball and roller bearings operating at speeds to 5000 RPM and temperatures up to 300 degrees F.

Write for a booklet, "The LUBRIPLATE Film", written especially for your industry.

LUBRIPLATE

FISKE BROTHERS REFINING CO.

NEWARK 5, N. J.
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OUR 75TH YEAR
1870-1945



DEALERS FROM COAST TO COAST

Always Good!

NOW BETTER THAN EVER

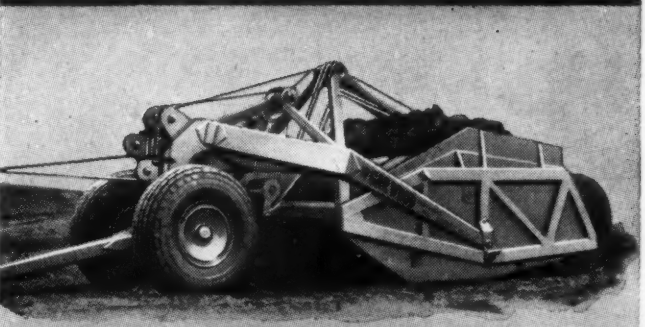
GAR WOOD CONSTRUCTION EQUIPMENT



Model F8C Cam and Roller Hoist with Type W12 Body. Capacity 5 cu. yds.



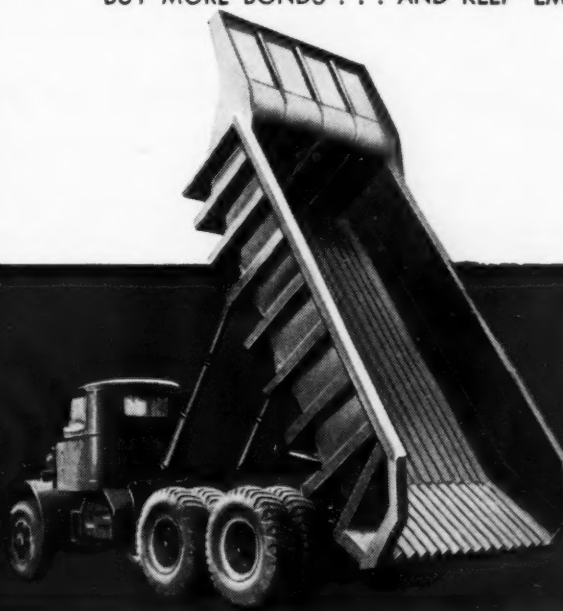
One-way side dump body with dual hydraulic hoist. Automatic downfolding side.



↑ 4-Wheel Cable Scraper—capacities 11, 15, 20 and 25 cu. yds. Rolling ejection. Accurate spreading.

← Tractor or utility winches.

Extra heavy duty type → X112 rock body with open or scoop-end. Hydraulic, twin telescope hoist Model T-4440.



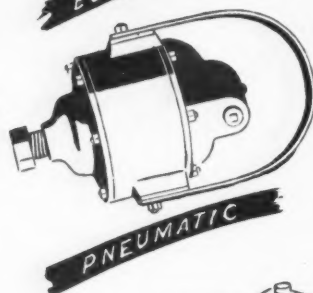
GAR WOOD INDUSTRIES, INC.

DETROIT 11, MICH.

WORLD'S LARGEST MANUFACTURER OF TRUCK AND TRAILER EQUIPMENT



HOISTS AND BODIES • WINCHES AND CRANES • TANKS • ROAD MACHINERY • HEATING EQUIPMENT • MOTOR BOATS



ORIGINATORS OF INTERNAL CONCRETE VIBRATION

You can bet that Viber, pioneer and originator, is keeping out in front with advanced improvements in internal concrete vibration. Turn your attention now to the high speed development (over 9500 RPM in concrete!) and other exclusive features which will keep Viber users safely beating schedules on job after job!

3 Kinds of Power

Viber offers 3 types of power units—electric, pneumatic, gasoline. All are adapted to use 3-inch, 2½-inch and the new 1¾-inch diameter heads. Viber-designed flexible casings are in 6-, 12-, and 21-foot lengths.

Portable—Rugged

Vibers are easy to handle, easy to move along on the job. But don't let handy size fool you . . . Viber's ruggedness is performance-proved on the toughest jobs!

**Write or Wire Today
for Fully Detailed
Viber Catalog**

726 South Flower Street
BURBANK, CALIFORNIA

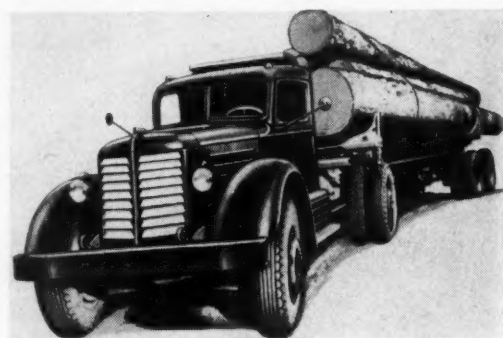
WAGON HAULING UNITS designed to handle earth, gravel, topping, coal, sand, limestone and other general hauling material, are being produced in three sizes: (1) Model 75, 10.5-yd. heaped capacity with standard sideboards; (2) Model 85 10.5-yd., heaped capacity, and (3) Model 120, 15-yd. heaped capacity. Powered by International Har-



vester diesel wheel tractor. Hydraulic transferring device between tractor and trailer prevents unnecessary hardships for tractor during fast part of haul, yet provides extra weight for traction when needed in rough going.—M-R-S Manufacturing Co., Jackson, Miss.



TEN TRUCK MODELS for commercial use have been authorized by WPB and are being built together with heavy-duty military vehicles on the same assembly line. These trucks are being manufactured in a wide range of power ratings, gear ratios and wheelbase lengths and in varying tonnage capacities. One model has a two-speed double reduction axle, a gross vehicle weight of 24,000 lb. and is equipped with a new vacuum control shift mechanism which permits driver, by merely turning dash lever, to change axle ratios instantly to either high or low range without



clutching by momentarily releasing foot throttle. Other models available to civilian operators with ODT certificates of purchase are: Two with nominal rating of 2 to 3 tons each and with gross vehicle weights of 15,000 lb.; three in light-heavy field having nominal ratings of 3 to 4 tons and listing gross vehicle weights of 20,000 lb.; five heavy-duty models ranging from 3½ to 7 tons listing gross vehicle weights of 24,000 lb. Feature in all heavy-duty models: incorporation of new and heavier steering gear mechanism with anti-friction knuckle bearings which will assure easier steering with heavy loads. Standard equipment on all Federal trucks: vacuum crankcase ventilating system which employs engine vacuum to withdraw from crankcase, acid and sludge forming vapors at all engine speeds, thus preventing their accumulation in crankcase and adding thousands of miles to engine life.—Federal Motor Truck Co., Detroit 9, Mich.

P&H



Added Values Mean Added Years of Service

True Rolling Crawlers — roller chain principle provides smoother travel and easier maneuvering. Here's longer life, too, with far less shoe replacement.

Planetary Transmission — faster reversal and more accurate control of bucket or dipper; lower maintenance costs.

Double-Safe Boom Hoist — enables you to raise or lower the boom quickly, safely. Even if cable should break, boom can't fall suddenly.

Hydraulic Control — for smoother, faster response and easier operation. This low-pressure system enables the operator to feel the load at all times.

All-Welded Construction — rolled alloy steels are tougher. Greater strength and rigidity mean longer life throughout.

Look into P&H's added values now and profit by them in the years ahead. Get the facts about *all* of them. Write for literature.

General Offices: 4494 W. National Avenue, Milwaukee 14, Wis.

P&H Excavators are available in sizes from $\frac{3}{8}$ to 6 cubic yards; gasoline, Diesel or electric powered.

*Your Dollars Buy
More When You
Buy P & H*

P&H

EXCAVATORS

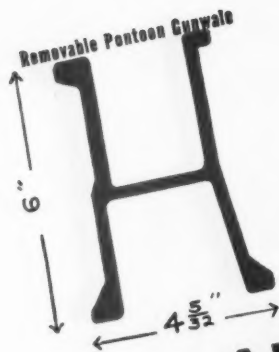
HARNISCHFEGER

CORPORATION

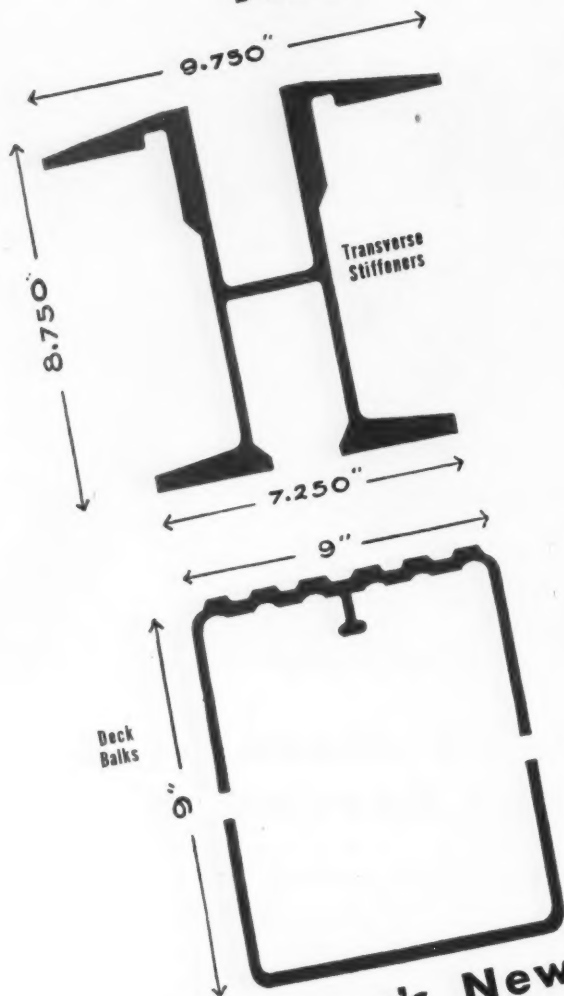
EXCAVATORS • ELECTRIC CRANES • ARC WELDERS



HOISTS • WELDING ELECTRODES • MOTORS



ALCOA EXTRUDED SHAPES



Constructed largely of aluminum extruded shapes and sheet—from pontoon skids to bridge deck—this new bridge goes into place fast and carries heavy loads.

Alcoa Aluminum extruded shapes speed the manufacture of bridge and pontoon boat parts. Metal is distributed as you see it here, to suit strength and structural requirements. In many cases, parts are ready for assembly as extruded.

The light weight makes handling of the boats and bridge members easy. A 15-foot deck balk, for example, weighs only 215 pounds; can be carried by four men. Laid side by side, but staggered to distribute the load, these balks form a continuous beam of roadway. ALUMINUM COMPANY OF AMERICA, 1865 Gulf Building, Pittsburgh 19, Penna.

In The Army's New Aluminum Floating Bridge



The M-4 floating bridge was developed by the Corps of Engineers, Army Service Forces. It is capable of carrying a 50-ton vehicular load across currents as swift as ten feet per second. A 300-foot section can be in service in less than two hours.

ALCOA FIRST IN ALUMINUM





Preformed wire rope

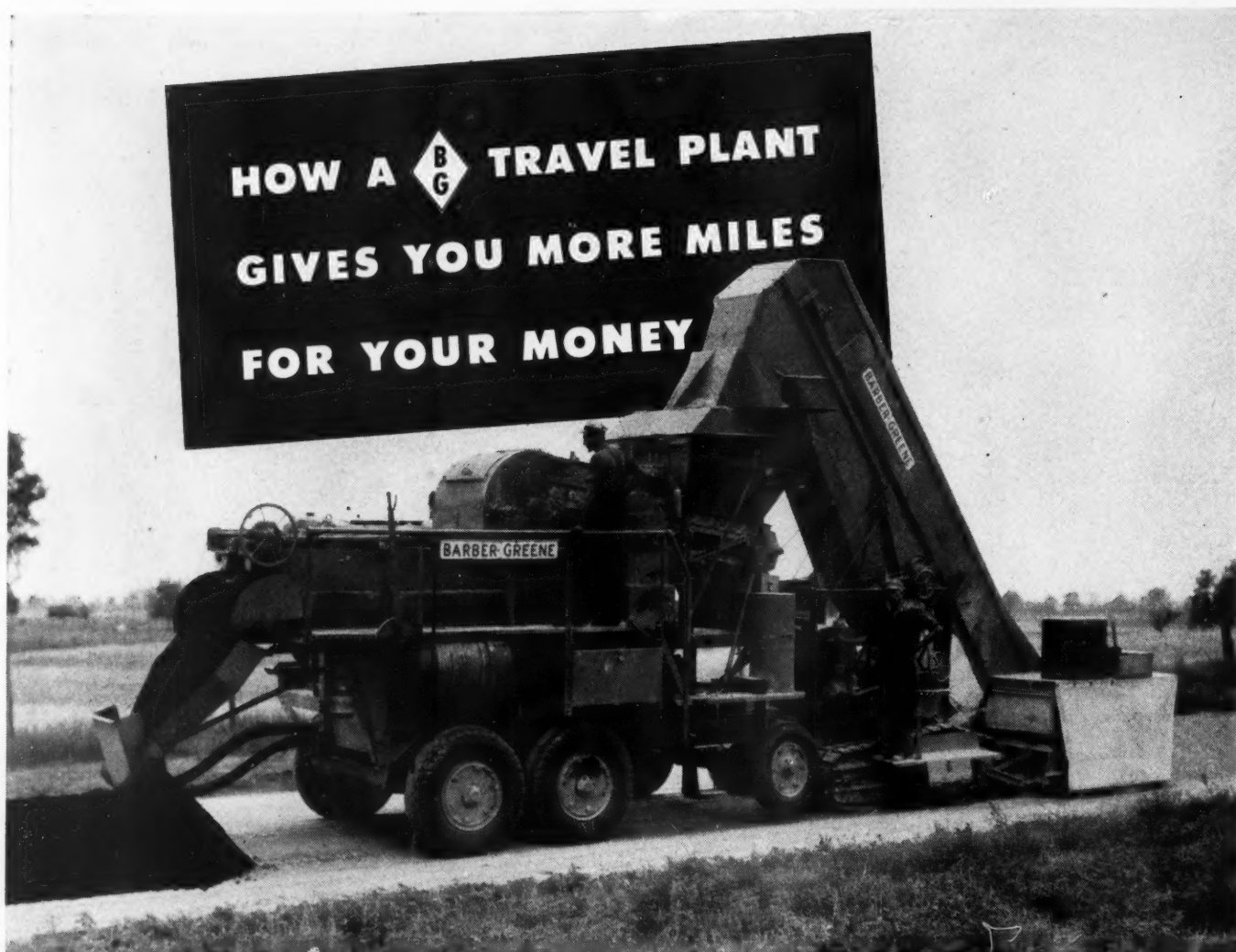
SAVES REPLACEMENT 3 WAYS

Since preformed wire rope lasts longer, obviously it reduces frequency of replacing the rope itself. Not quite so obvious, but equally important, is the ease with which preformed wire rope adjusts itself to different uses. Because of its ready adaptability—its resistance to rotating in sheave grooves and its better spooling qualities—preformed postpones the replacement of machine parts or shut-downs for repairing.

A third way in which preformed wire rope saves replacement is with the men on the job. As preformed rope is safer to handle it reduces lost-time accidents.

Make certain your next wire rope is preformed.

ASK YOUR OWN WIRE ROPE MANUFACTURER OR DISTRIBUTOR



● Building longer lasting asphalt roads is only *one* of the ways a Barber-Greene Travel Plant gives you more for your money.

Here's how a B-G Travel Plant cuts down construction expense to help you stretch limited funds into more miles of completed highways:

- * Continuous, high quality production. No batches, no pauses. No human element to lower capacity . . . no dependence on operating skill to maintain consistency.

- * Reduction of the weather hazard. No partially-prepared material to be spoiled by sudden showers.

- * Full working periods. Short mixing cycle permits operation on colder days, later at night, earlier and longer in the season.

- * No sacrifice of bitumen quality to allow for time-consuming blading. No rich or lean spots.

Lower percentages of heavier and quicker-setting bitumen with less solvent produce uniformly-coated mixes.

- * Easy job coordination. Mixing and proportioning performed by a single unit under control of two or three men. When aggregate is windrowed well ahead, it's automatically available as needed.

- * Low investment. Cost of the B-G Travel Plant is no more than that of the necessary machines for mixed-in-place construction of the same mileage.

- * Versatility. Handles all types of bituminous and stabilized work. Can be centrally located for maintenance requirements . . . becomes an integral part of Central Plant set-up for production of high-type mixes.

Write for catalogs describing how the economical operation of B-G equipment enables you to surface roads with plant-mixed material at blade-mix cost. Barber-Greene Company, Aurora, Illinois.

45-9

Barber-Greene
B
G
Constant Flow Equipment

Another Earth Drilling Problem Solved

NEW TIME SAVING EARTH DRILL Reveals Ingenious Application of **DIAMOND ROLLER CHAINS**

Tough earth drilling jobs now cost less in time, labor and maintenance because of the ingenious design of the new Buda Earth Drill which incorporates the high mechanical efficiency of Diamond Roller Chains for profitable long-time operation under unusually severe usage.

Because chain dependability was so vital a consideration in the design and operation of this new Earth Drill, it is significant that Buda engineers selected Diamond Roller Chains as original equipment. For important jobs where reliable, efficient, dependable operation is required, leading manufacturers—of all types of earth moving equipment—have, for years, preferred Diamond Chain. **DIAMOND CHAIN & MFG. CO.**, 418 Kentucky Avenue, Indianapolis 7, Indiana. Offices and Distributors In All Principal Cities.



Illustration shows Buda Earth Drill, pre-boring for piles through 22 feet of tough soil for over-pass supports. Earth Drill equipped with Diamond Roller Chains, "drilled all holes clean and straight in much shorter time than would be possible with other methods."

Improved L. A. Tower and Feed drills small diameter holes to 100 ft. max. depth and holes up to 42" diameter to 10 ft. max. depth. Equipped with Diamond Roller Chain.

DIAMOND ROLLER CHAINS

for HIGHWAYS & AIRPORTS

The modern JACKSON Vibratory Paving Tube is the only full-width internal vibrator for highway and airport paving, backed by many years satisfactory use under widely varying conditions. Proved performance certifies to the contractor and engineer that they will get desired results in efficient and economical operation, placement, density, strength and wearing surface of the finished slab. This holds true for the usual mixes designed for vibratory placement and those made with air entraining cements.

The JACKSON Tube is super-powerful, with plenty of reserve beyond the toughest jobs encountered . . . is easily attached to any modern conventional finishing machine . . . available in 10 to 25 foot widths . . . simple, dependable with all "bugs" out.



JACKSON VIBRATORY PAVING TUBE

Standard, full-width, dual vibratory tubes submerged horizontally in concrete have proved most efficient through years of exhaustive tests and extensive use. Powerful high-frequency vibratory impulses are transmitted in force through the thickest slab, quickly transforming the stiffest mixes into uniformly workable condition. If desired, other types of vibratory elements can be easily substituted with the same basic frame and carriage.

The reserve capacity of the power plant can be used to run hand operated vibrators in conjunction with the tube. The power plant also generates power for electric tools and lights used on night clean-up or emergency operations.

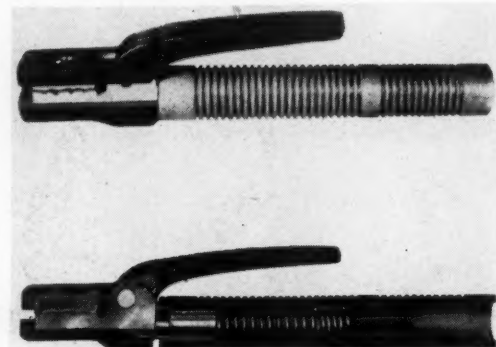
**THERE IS A RIGHT JACKSON
CONCRETE VIBRATOR FOR EVERY JOB**

MANUFACTURED FOR

JACKSON VIBRATORS, Inc.

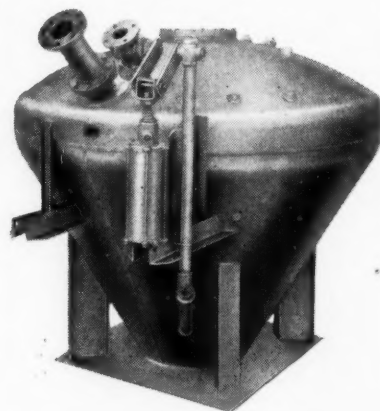
by ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan

ELECTRODE HOLDER has a heat-resisting "Everlast" plastic jaw cover which is claimed to give 20 to 30 times longer service and to eliminate the necessity for constant changing and servicing of jaw, as well as handle covers. Another feature is flexibility of device which enables welding rod to be consumed down to a mere stub without necessity of bending. Grip holds all rod sizes.



Quick-change lever action jaws can be replaced in less than a minute without tools. All parts quickly interchangeable as there are no pins nor bolts which assures fast servicing and cleaning. Wear-resisting plastic handle cannot come off by itself, a necessary safety feature. Other advantages: (1) "Air-conditioning" keeps unit cooler under continuous operation; (2) may be removed quickly from cable so that welder can place his personal electrode holder in his locker at night out of the way of possible damage.—Pacific Engineering Corp., 3123 San Fernando Road, Los Angeles 41, Calif.

*Move Cement by
Air-Floating It!*



The ROBINSON AIR-ACTIVATED CONVEYOR SYSTEM is practical and efficient, saving in air and maintenance. It has been used on numerous big construction jobs as well as in process plants.

You can order the entire system installed including compressor, piping, storage tanks, etc. or just the activator to be used with your own accessory equipment.

Write for illustrated Bulletin No. 310.
**ROBINSON AIR-ACTIVATED CONVEYOR
SYSTEMS**

Division of MORSE BOULGER DESTRUCTOR CO.
211-C EAST 42nd STREET, NEW YORK 17, N.Y.
Representatives in all Principal Cities

BUILD BETTER *Airports*

Use a CEDARAPIDS
Model "E" ASPHALT PLANT



Cedarapids

Built by
IOWA

THE IOWA LINE

of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS	REDUCTION CRUSHERS
BELT CONVEYORS	BATCH TYPE ASPHALT PLANTS
STEEL BINS	TRAVELING (ROAD MIX) PLANTS
BUCKET ELEVATORS	DRAG SCRAPER TANKS
VIBRATOR AND REVOLVING SCREENS	WASHING PLANTS
STRAIGHT LINE ROCK AND GRAVEL PLANTS	TRACTOR-CRUSHER PLANTS
FEEDERS—TRAPS	STEEL TRUCKS AND TRAILERS
PORTABLE POWER CONVEYORS	KUBIT IMPACT BREAKERS
PORTABLE STONE PLANTS	
PORTABLE GRAVEL PLANTS	

The three thousand new airports to be built after the war must be smooth, permanent, dustless, all-weather, have tremendous load-carrying capacity and be economical to build and maintain. All these features can be had by building runways, taxi strips, aprons, service roads and hangar floors with asphalt. Here's the opportunity for real profits for contractors with Cedarapids asphalt plants. The Cedarapids line of bituminous mixing plants is the most diversified and complete offered by any manufacturer. Take the Model "E" for example, which will enable you to bid successfully on any bituminous job that comes along. Power consumption is low. Grading and proportioning are accurate beyond the tolerances of the most rigid specifications. Its 3000 or 4000-lb. capacity is large enough to handle the largest jobs. The "E" can be set up as a permanent installation or used as a portable plant. Erecting, knocking-down and transporting are exceptionally easy for a plant of this size. Everything has been included that contributes to money-making production. Remember Iowa is also headquarters for aggregate producing equipment too. See your local Iowa dealer for full information.



IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa





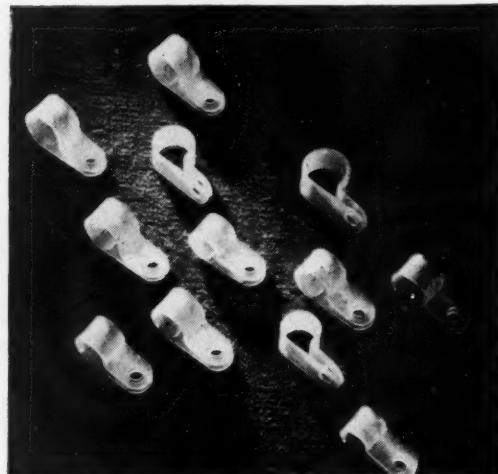
Winning Combination

In the Insley Excavator, you get a hoist and swing mechanism with the winning combination for longer wear-life, easier maintenance, simpler operation. All 10 ball bearings are shielded . . . pre-lubricated for the life of the machine . . . no grease works into clutch or brake. Its two main drum clutches and two swing clutches are all identical . . . one spare clutch band is all you need. Drum shaft is extra large, accurately ground. Gears are cut from solid steel blanks.

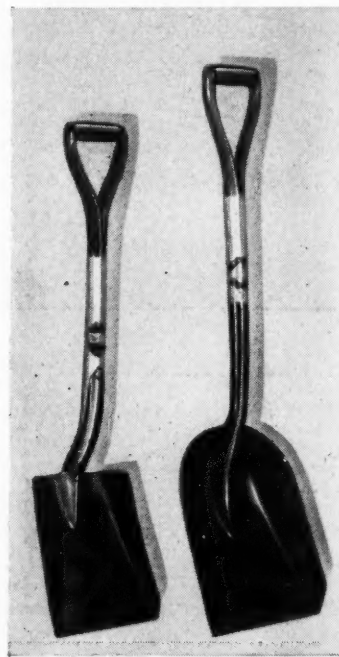
You'll like these features of design and construction because—like every Insley feature—they contribute to lower cost yardage. For your new equipment—when we can again supply it—choose a $\frac{3}{8}$ or $\frac{1}{2}$ -yd. Insley Excavator . . . five easily interchangeable attachments—shovel, crane, hoe, clam-shell and dragline.



PLASTIC CABLE CLIPS for fastening wires, cables and hydraulic lines are non-corrosive, non-conductive, light weight, strong and resistant to acids, alkalis and oils. Feature: rolled edges of design and abrasion-free nature of plastic surface prevent



wear-off of insulating materials. Fabricated with LT Ethocel, a thermoplastic which provides toughness, shock resistance at low temperatures and low dimensional change over a wide range of atmospheric conditions. Item is now on production basis and clips may be had in a variety of sizes. —The Dow Chemical Co., Midland, Mich.



BLADE EDGES
GUARANTEED SPLIT - PROOF

INGERSOLL SHOVELS
"The Borg-Warner Line"

Write for Catalog and Prices
INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
New Castle, Indiana
Plants: New Castle, Ind.; Chicago, Ill.; Kalamazoo, Mich.

Read the inside dope.... here's why Winslow filters thoroughly clean lube oil

CLEAN INSIDE AND OUT

All acid and most of the injurious gums and resins are removed by neutralizing agents in Winslow Oil Conditioners.

KEEPS WATER OUT

Very little moisture can penetrate Winslow's water repellent surface...

(Even if it did - the absorbent fibers inside would promptly drink it up).

EXPANDS WITH USE

The curly cellular wood fibers within the Winslow Element straighten out and expand instead of becoming compressed as they absorb moisture, acid and other impurities - insuring free flow and effective filtering for longer periods of operation.

SQUEEZES OUT DIRT

The filter channel narrows from the outer surface toward the center like a piece of pie so that larger particles of dirt are first deposited and smaller ones later removed. As a result, foreign matter is deposited evenly through the element and not only on the outside ring .

WRITE today for FREE BOOKLET which ends all filter mysteries in 20 fact-filled, color pages similar to those above.

Write or wire today for full franchise information to Winslow Sales Company, 406 Montgomery Street, San Francisco 4, California

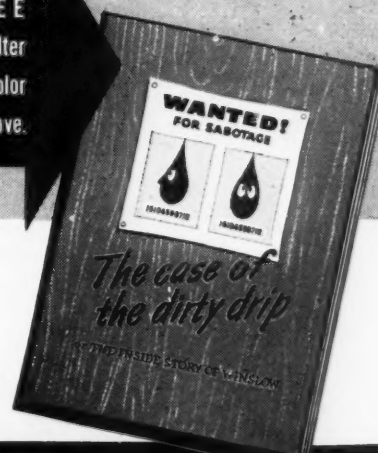
A PRODUCT OF

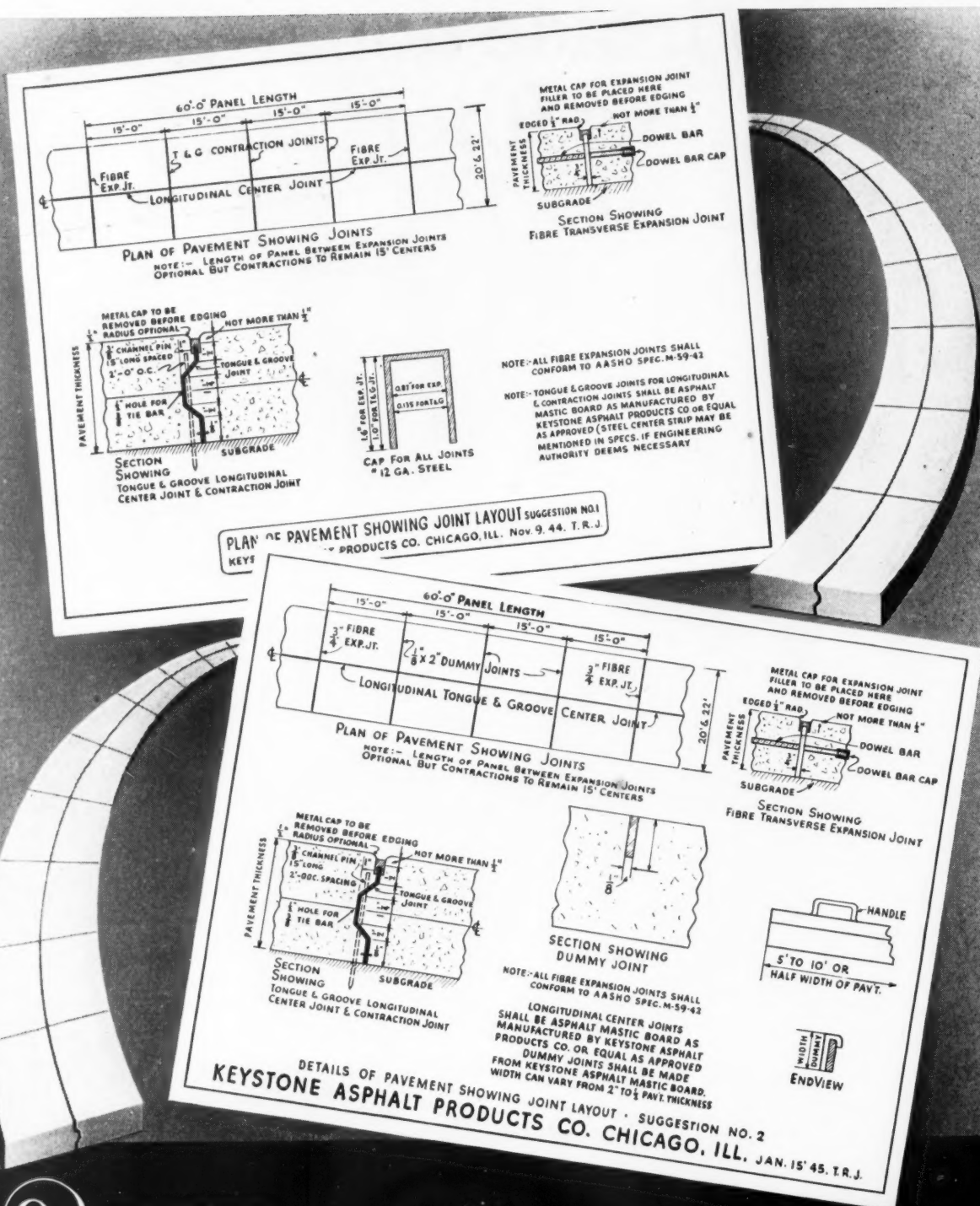
WINSLOW ENGINEERING CO.
OAKLAND 8, CALIFORNIA

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WINSLOW

FUEL FILTERS • OIL CONDITIONERS • ELEMENTS





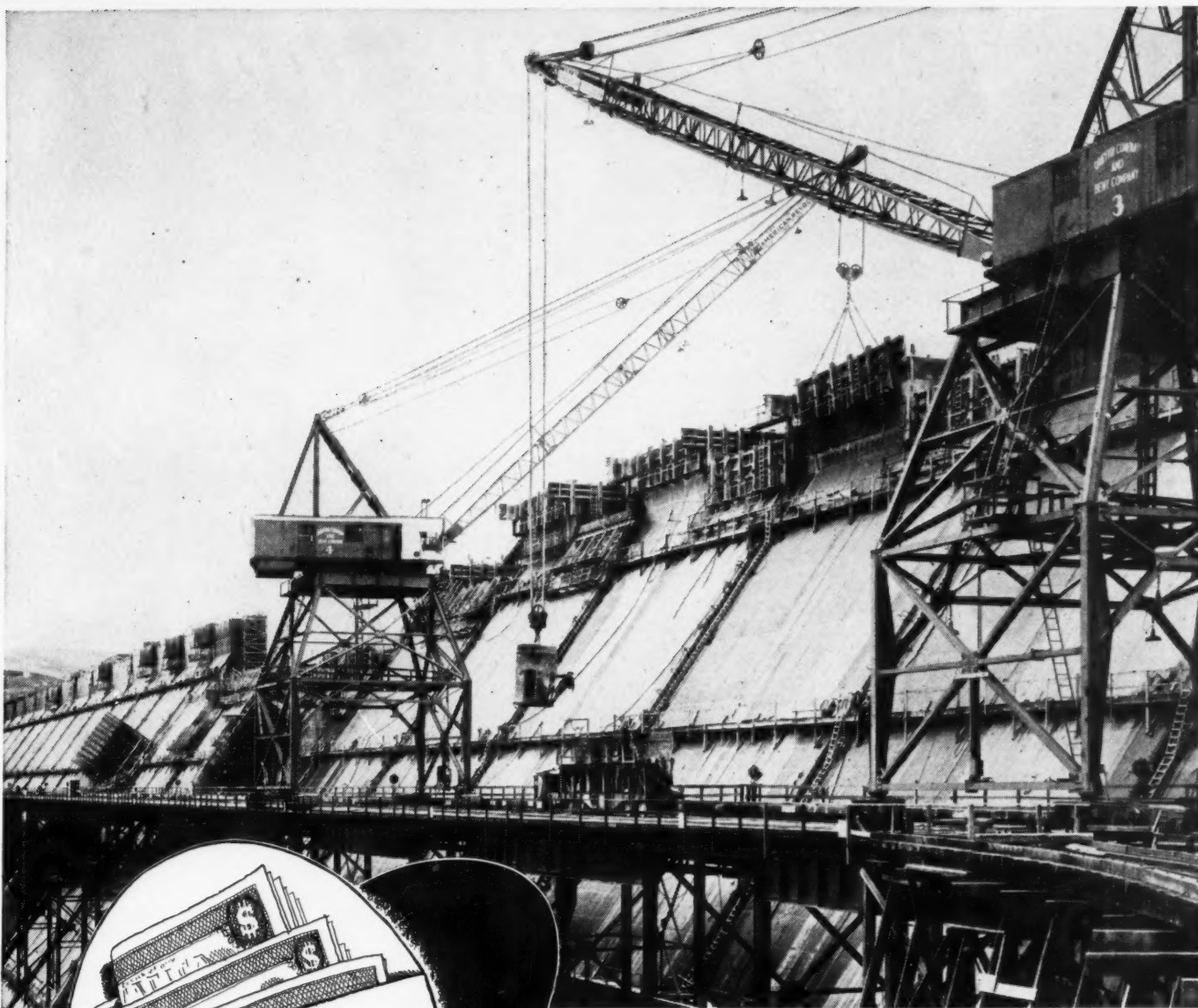
2 PLANS FOR MODERN JOINT DESIGN AND LAYOUT

These plans for modern highway design and construction, results of careful study of test and actual installations, carry out the thinking of forward looking highway engineers. Plan Number 1 shows Keystone Mastic Board Tongue and Groove Joint used as a longitudinal center strip as well as for transverse contraction joints—giving a maximum of load transmission between slabs. In Plan 2, Keystone Mastic Board Tongue and Groove Joint is used as center strip with Keystone Mastic Board Dummy

Joint to create plane of weakness type contraction joints. FREE—Send for illustrated folder giving opinions of leading highway authorities as to the efficiency of Keystone's plans and designs for modern, concrete highway construction. It's full of valuable information on how Keystone can help you plan and produce better, longer-lasting concrete pavements. We'll also send complete blue-prints of the above plans and a catalog of Keystone "Road Tested" paving products.

KEYSTONE ASPHALT PRODUCTS CO.

43 E. OHIO STREET, CHICAGO 11, ILLINOIS • MANUFACTURING PLANT: CHICAGO HEIGHTS, ILLINOIS

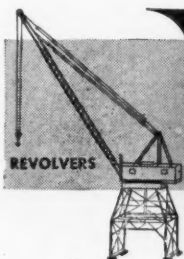


Two "American" Revolvers at construction of Friant Dam in California

**MORE FOR YOUR
WAGE DOLLAR**
... WITH
**"AMERICAN"
EQUIPMENT!**

Today it's important to be sure that your operators like the equipment they use . . . equipment that is comfortable and safe . . . equipment that reduces operator fatigue and, at the same time, speeds-up every vertical, lateral and horizontal movement of the materials handled.

That's why it will pay you to investigate the proved efficiency of "American" Revolvers and other "American" equipment. It assures a sound investment that will net *more* for your wage dollars *now* and in the important post-war years to come. Experienced "American" field engineers are ready to serve you. Why not consult with them when you *begin* to plan your projects? Write for complete information.



REVOLVERS

**AMERICAN
HOIST & DERRICK CO.**

St. Paul 1, Minnesota

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LOCOMOTIVE CRANES
BLOCKS AND SHEAVES



HOISTS



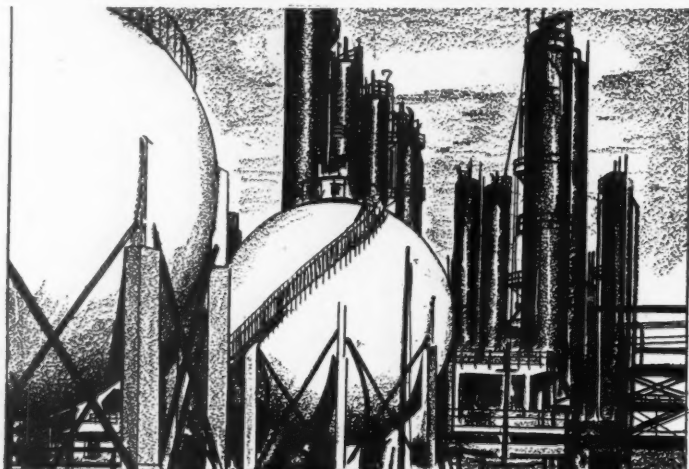
DERRICKS



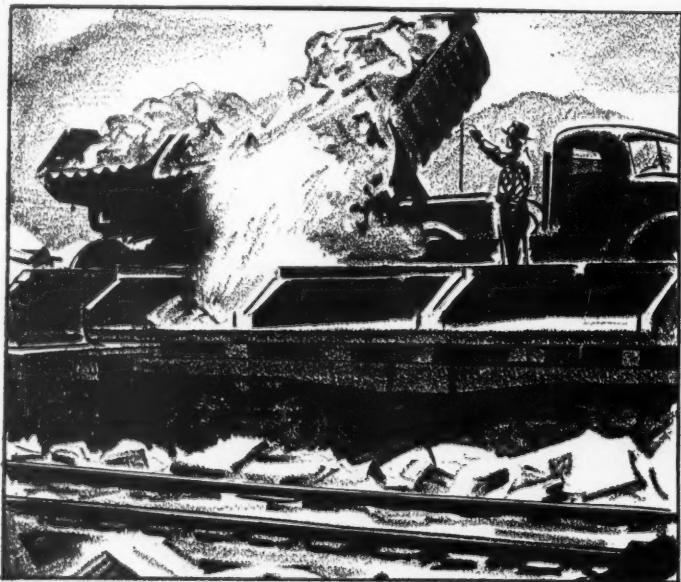
CROSBY CLIPS

Do you know that...

A TANK CAR TRAIN STRETCHING FROM WASHINGTON TO QUEBEC WOULD BE REQUIRED TO CONTAIN A SINGLE YEAR'S PRODUCTION OF CRUDE OIL FROM SINCLAIR'S 8000 WELLS.



SINCLAIR RUBBER INC., A SINCLAIR SUBSIDIARY, MANUFACTURED IN ONE YEAR SUFFICIENT BASIC MATERIAL TO PRODUCE 78,000 TONS OF SYNTHETIC RUBBER. THIS PLANT AT HOUSTON, TEX., IS SINCLAIR OPERATED FOR THE GOVERNMENT.



FOR SAFE LUBRICATION OF EQUIPMENT UNDER HEAVY DUTY OPERATION SINCLAIR PROVIDES SPECIALIZED MOTOR OILS AND GREASES... ALSO TEN-OL PREPARED SPECIFICALLY FOR DEISELS, DEISEL-POWERED BUCKETS SHOVELS, AND BULLDOZERS.

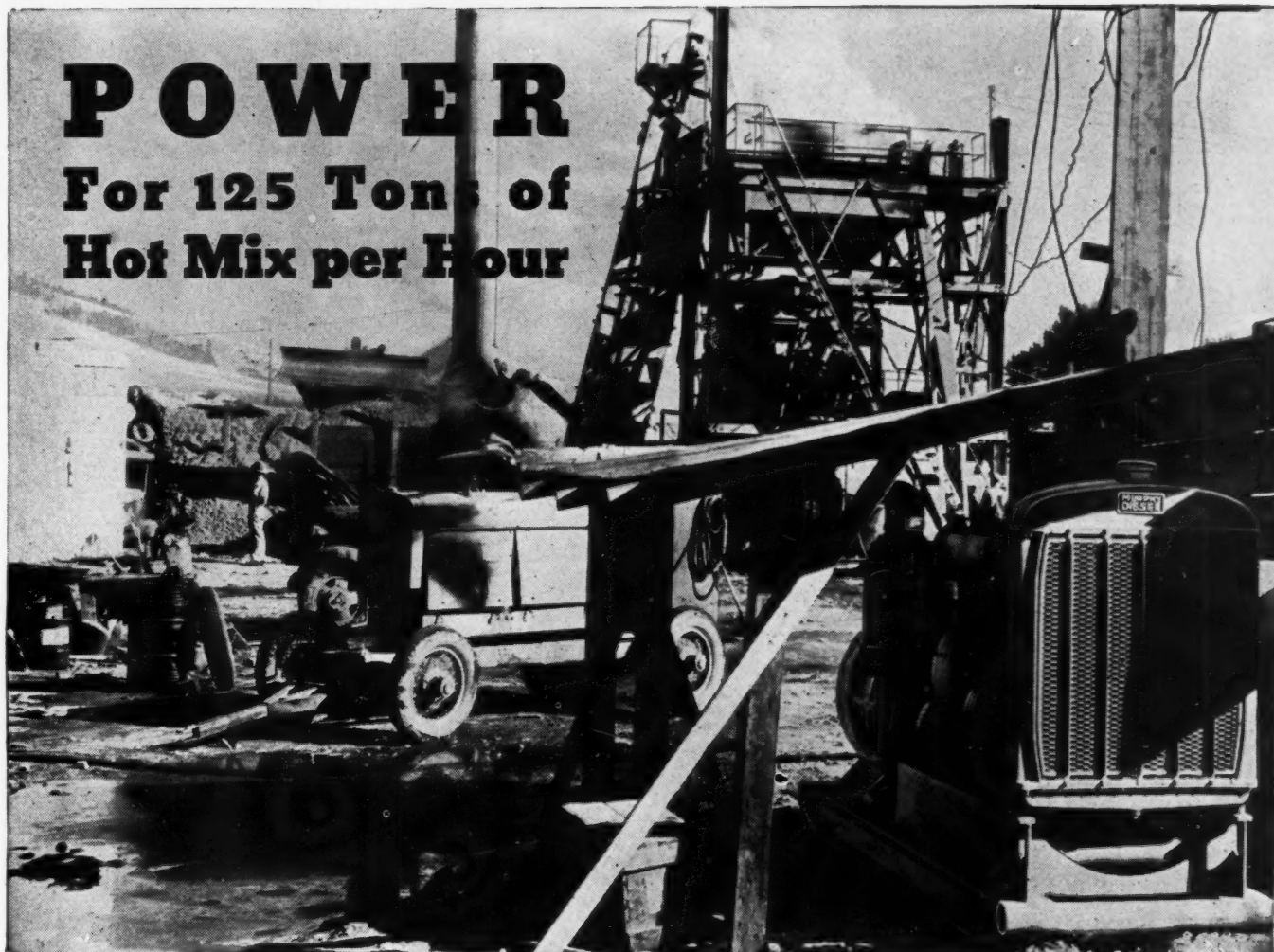
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FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

POWER

For 125 Tons of
Hot Mix per Hour



Model ME-650 Murphy Diesel Generating Set—240 Volt, 3-phase, 60-cycle, 106 KW continuous capacity, powering a "Cedar Rapids" Hot Asphalt Plant for R. P. Herrick at Frenchtown, Montana.

MURPHY DIESEL Engines and Generating Sets have won their well-earned reputation for "More Power, More Profit" by their ready adaptability to the many power requirements of the construction industry.

This R. P. Herrick asphalt plant on the big Frenchtown, Mont. asphaltting job...requiring 18,000 tons of material...is typical of Murphy

Diesel performance which permitted an average of 125 tons of hot mix per hour...considerably better than the record before installing the Murphy Diesel Generating Set.

Soundly engineered for heavy-duty work, Murphy Diesels have the ruggedness it takes to stay on the job...and the power, dependability and economy to do the job profitably. Write for bulletin.



★ Buy U. S. War Bonds ★

More Power

**MURPHY
DIESEL**
Reg. U.S. Pat. Off.

More Profit

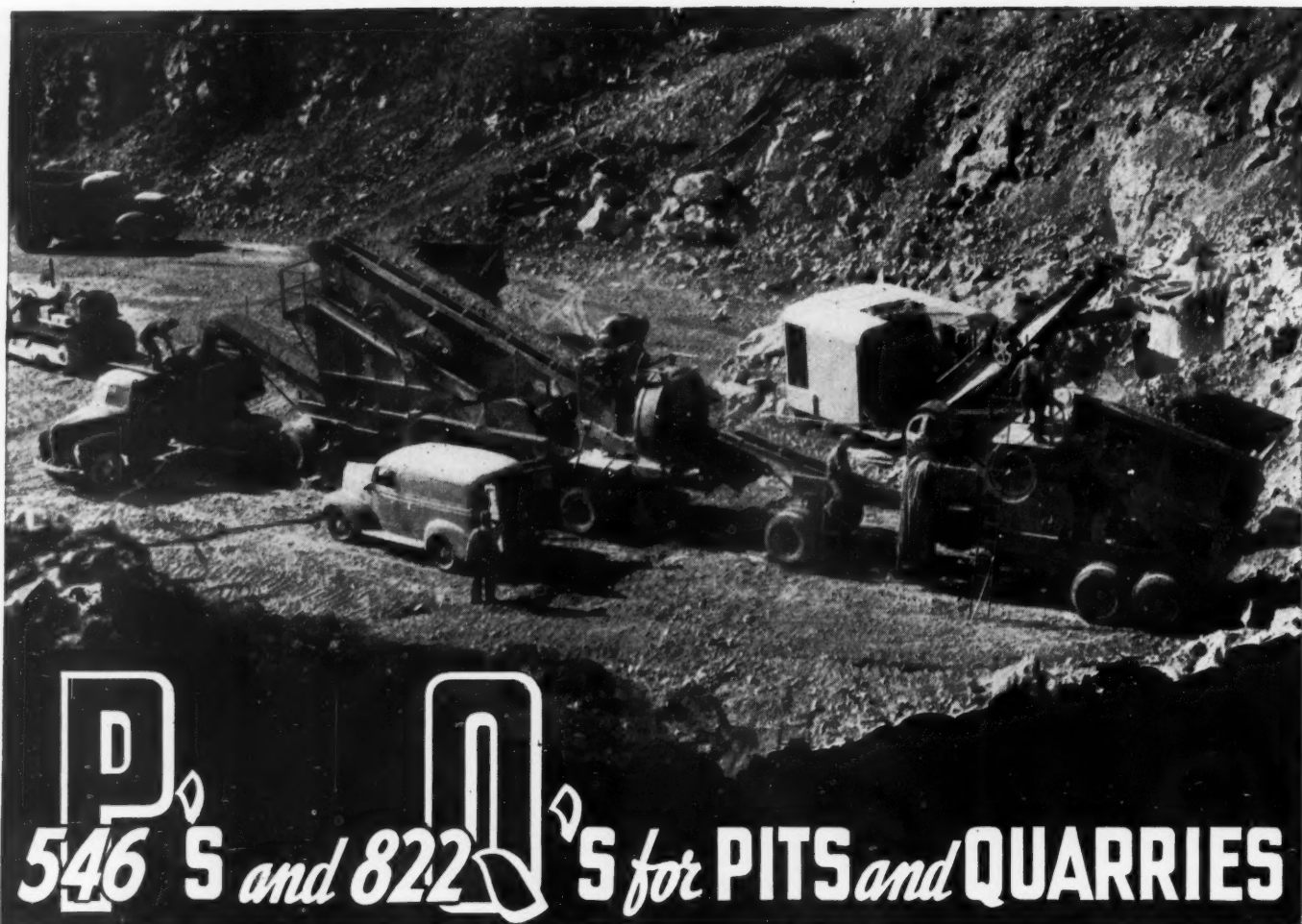
MURPHY DIESEL COMPANY

5339 West Burnham Street
Milwaukee 14, Wis., U. S. A.

*Engines : FROM 90 to 215 HP
Generators : FROM 60 to 115 KW*

"FIELD-PROVEN Power"

101



P's and Q's for PITS and QUARRIES

Gallagher-Nelson of Oregon, Ill., know their P's and Q's. Having some time ago purchased a Universal No. 800 gravel plant consisting of a 40" x 22" roller bearing roll crusher, 4' x 12'—2½" deck screen with a 30" feed conveyor on a pneumatic tired truck, it was a simple matter to convert this unit into an 822-Q rock crushing plant by the addition of a No. 546-P primary unit. This unit consists of a 20" x 36" WRB jaw crusher, a 36" x 8' apron feeder, a grizzly and by-pass, a 30" under-conveyor—all mounted on a pneumatic tired truck. We repeat—Gallagher-Nelson know their P's and Q's.

An inbuilt feature of Universal gravel and rock crushing, screening and loading plants long recognized by contractors and public works officials is the ease with which new standardized units may be added to increase capacity, to change over from gravel to rock crushing or to add washing or other processing not included in the original plant.

Ask your Universal dealer to show you these exclusive design features common only to Universal-engineered equipment.

A general view of Gallagher-Nelson's Universal 546-P primary crushing unit and "800" secondary crushing unit forming the "822-Q" quarry plant shown working near Polo, Ill. Note the close-coupled compactness of this electrically-powered rock reduction plant.



Close-up of the 546-P primary unit. Electrically-driven, it consists of a 20" x 36" WRB jaw crusher, a 36" x 8' apron feeder, a grizzly with by-pass and a 30" under-conveyor.

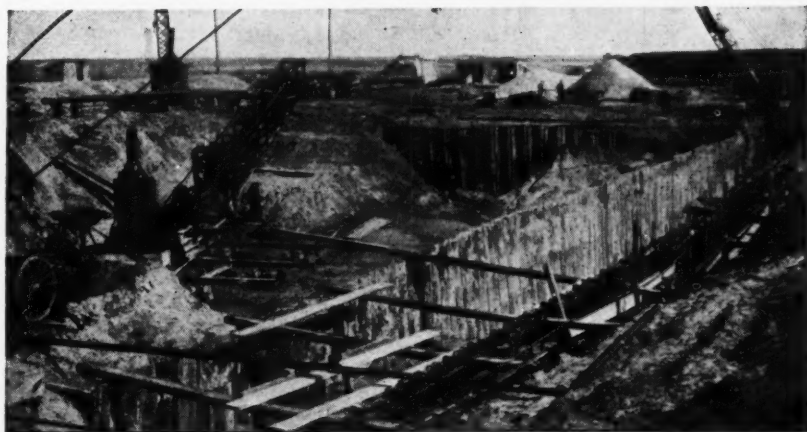
UNIVERSAL ENGINEERING CORPORATION

620 C Avenue, West
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UNIVERSAL

ROCK AND GRAVEL CRUSHERS, CRUSHING ROLLS, HAMMER MILLS, COMPLETE CRUSHING AND SCREENING PLANTS, WASHING PLANTS, ASPHALT PLANTS, SPREADERROLLERS.

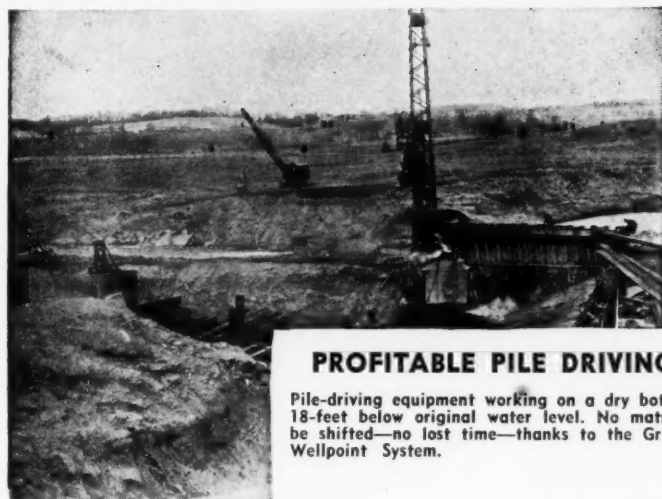
Some Griffin Wellpoint Jobs



GRIFFIN SYSTEM COST ZERO

The engineers invested in tons of steel sheeting for the construction of this power plant foundation, expecting plenty water trouble, but GRIFFIN Wellpoints in the fine silty sand so successfully stabilized it, the sheeting was actually unnecessary.

When a new addition to the plant was started, a GRIFFIN System was again on the job—and no sheeting was purchased, as all banks could be sloped. The saving of this one item was greater than cost of the wellpoint installation.



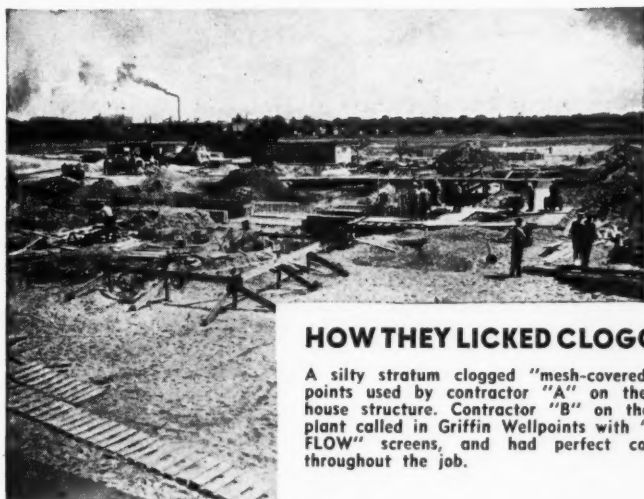
PROFITABLE PILE DRIVING

Pile-driving equipment working on a dry bottom 18-feet below original water level. No mats to be shifted—no lost time—thanks to the Griffin Wellpoint System.



KEEPING A HILL OUT OF A HOLE

Open pumping undermined the spring-filled hill at the right; a mass movement into the partly excavated site had started. The installation of a GUARANTEED Griffin Wellpoint System saved the day.



HOW THEY LICKED CLOGGING

A silty stratum clogged "mesh-covered" wellpoints used by contractor "A" on the screen house structure. Contractor "B" on the power plant called in Griffin Wellpoints with "INTERFLOW" screens, and had perfect conditions throughout the job.



QUICK DIGGING IN QUICKSAND

Intake and Discharge tunnels in quicksand are a slow and costly problem. A Griffin Wellpoint System converted a bad ground condition into a dry, stable bottom in a FEW HOURS.

**FOR
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MID-WEST

GRIFFIN EQUIPMENT CO., INC.
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GRIFFIN WELLPOINT CORPORATION**

Only the "DUCK"
Could Do It



Signal Corps photo shows how two GMC "Ducks," fastened together with steel bars and cables, transport a P-38 fighter plane.



Today there's a significant double meaning to the familiar saying, "You can never tell where lightning will strike next." Thanks to the amphibious ability of the GMC "Duck," fast-flying Lightning or P-38 fighter planes can be transported directly from ship to shore to inland flying field . . . completely assembled and all set for a take-off that will take the enemy by surprise.

In fact, wherever Allied fighting forces need a multiple-ton transport vehicle that can travel by water as well as by land, there you'll usually find GMC's sensational sea-going truck—the "Duck." This amazing amphibian, like the Army's basic 2½-ton, six-wheel drive transport truck, is a development of GMC Truck & Coach . . . producer of well over a half a million military vehicles.

In addition to being one of the largest producers of military vehicles, GMC builds many commercial trucks for essential users. Civilian GMCs are powered by engines of the same basic design as the famous "270" used in more than 475,000 GMC "six-by-sixes" . . . the "Workhorse of the Army."



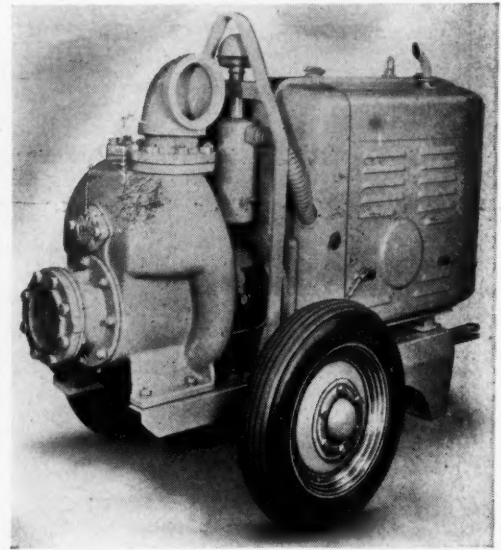
INVEST IN VICTORY . . .
BUY MORE WAR BONDS

GMC TRUCK & COACH DIVISION GENERAL MOTORS



HOME OF COMMERCIAL GMC TRUCKS AND GM COACHES
VOLUME PRODUCER OF GMC ARMY TRUCKS AND AMPHIBIAN "DUCKS"

6-IN. SELF-PRIMING CENTRIFUGAL PUMP, suitable for construction work, oil fields or industrial applications, is rated 90,000 gpm. and is claimed to be unusually efficient because of the following design features: Mixed flow impeller and properly



proportioned and shaped volute; triple self-adjusting shaft seal; dual prime method of priming large ground shafts; built-in suction check valve; oversize ball bearings; improved flexible coupling drive and heavy-duty engine. Also available with 1,800 to 1,200 rpm. electric motor or diesel engine.
—Construction Machinery Co., Waterloo, Iowa.

National Carbide FLOODLIGHTS



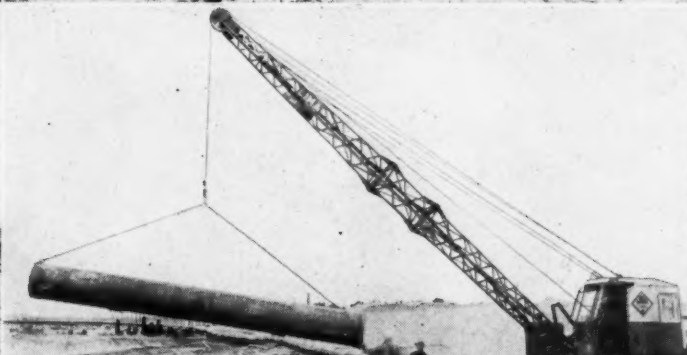
FOR ALL
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WHERE
FLOOD-
LIGHTS ARE
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Simple in Construction
Economical in Cost
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Available in 1500,
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Light illustrated. Write
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SOME DAY YOU ARE GOING TO BUY A

When you buy your next $\frac{3}{4}$ yard shovel, crane, dragline or pull-shovel you can make no better choice than a LIMA PAYMASTER. The PAYMASTER is relatively light in weight yet rugged enough to withstand the most severe conditions encountered in hard digging. It is equipped with an 18' box type boom and 15' tubular type dipper handle. When equipped as a shovel the PAYMASTER can easily be converted to a crane, dragline or pull-shovel or conversely without major dismantling. Such an advantage makes the PAYMASTER an efficient tool, adaptable to many kinds of work. A LIMA shovel, crane or dragline is identified by the Diamond on the cab. The LIMA Diamond is a symbol of 75 years of quality workmanship and dependable service.

Write now for a copy of bulletin No. 034 C.

LIMA LOCOMOTIVE WORKS, Incorporated
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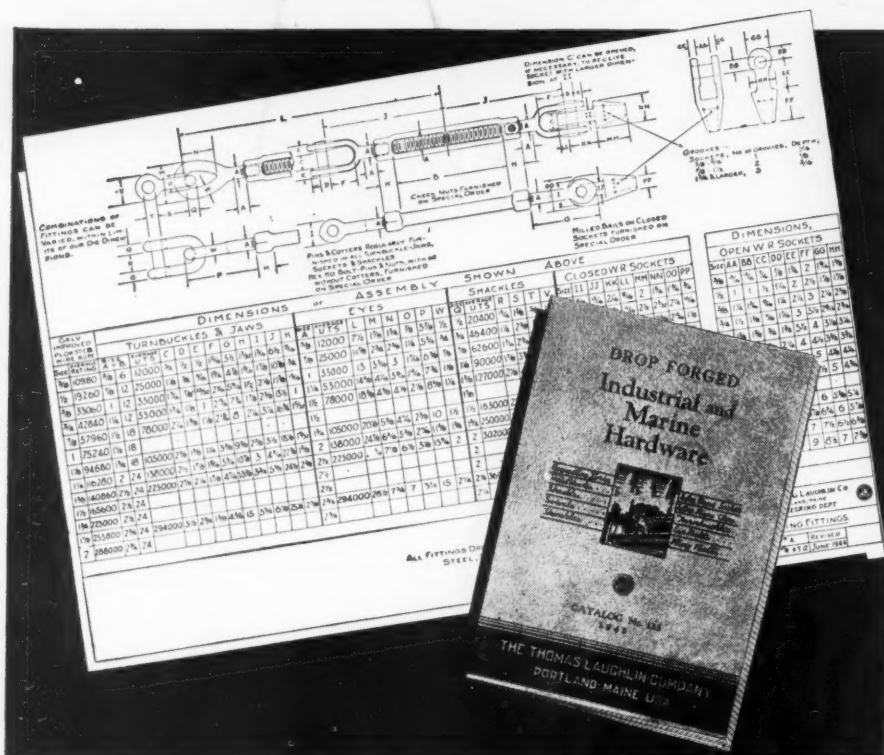
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LIMA

SHOVELS • DRAGLINES • CRANES • PULL-SHOVELS

NEW CATALOG ON THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



NEW ITEMS...NEW ENGINEERING DATA SIMPLIFY SELECTION OF THE RIGHT FITTINGS

To simplify your job of selecting the right combination of fittings for any wire rope or chain assembly... Laughlin's new Industrial and Marine Hardware Catalog No. 135 is now ready.

This catalog displays every item in the most complete line of drop-forged wire rope and chain fittings on the market. New items have been added since the last catalog was published — and your nearby mill, mine or oil field supply house is taking orders for them.

New engineering data and tables simplify such problems as picking the right hook for a specified rope or chain size and safe load... the right products for a turnbuckle assembly with shackles or sockets... and many others.

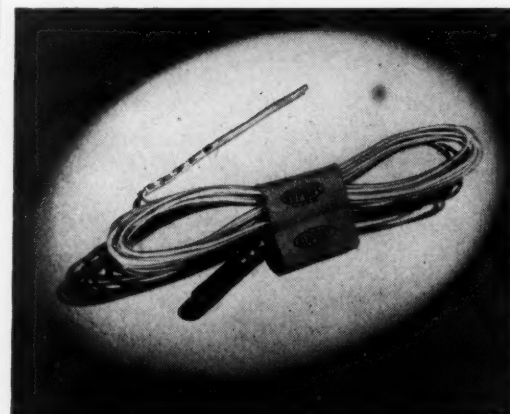
Your file of vital buying information will not be complete until you have this handy catalog at your finger tips. Write on your business letterhead for your copy of Catalog 135. Dept. 1, The Thomas Laughlin Co., Portland 6, Maine.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



ELECTRIC BLASTING CAPS have two improvements, nylon insulated wires and rubber plug closures. Wire covering of tough, abrasion-resistant nylon is the equal of enamel insulation in preventing current leakage. It is not affected by extreme or rapid changes in temperature and is in brilliant colors, minimizing the possibility of error in con-



nections. In addition to reducing the possibility of misfires, new wires are clean to handle and resist kinking. The rubber plug closures, double crimped in the shells, replace the combination of bridge plug, asphaltic waterproofing and sulfur seal, thus increasing resistance to water penetration. New shells are much shorter than old type without sacrifice of explosive strength. Thus, priming is said to be made easier and safer.—E. I. duPont de Nemours & Co., Wilmington 98, Del.

You Can Help

● Paper is a Number 1 war material shortage — because over 700,000 different war items are wrapped, packaged, labelled, tagged, or made from paper or container board. The Pacific war, when it speeds up, will require stupendous amounts of paper and board since double and triple packing are required for protection against weather, insects, etc.

So please —

1. Share this magazine with your associates. Because of the paper shortage, the number of copies is limited.
2. Organize for a continuous drive in your office and plant to collect waste paper of any kind to put into paper salvage. Clean out old files, dead correspondence, obsolete records, useless display materials, cartons.

Aid the war effort—speed victory
DO THIS EXTRA BIT TO HELP.



RUGGED AND READY...

Armed with a Barco Portable Gasoline Hammer, a man is ready for any breaking, drilling, driving and tamping job. Under the toughest conditions... in hard-to-reach spots, Barco has a tried and true high performance record. Eleven special attachments make Barco useful and economical on a wide range of heavy work.

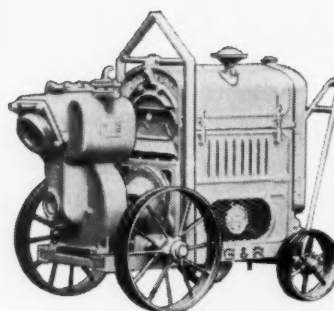
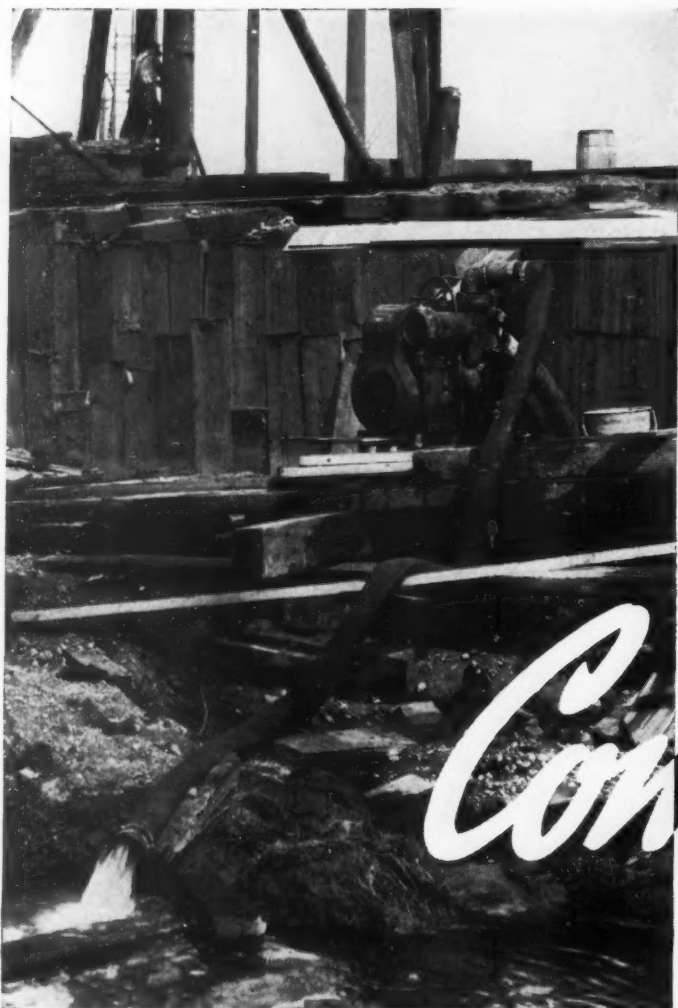
Try One

BARCO

Portable Gasoline Hammers

THE FREE ENTERPRISE SYSTEM IS THE
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BARCO MANUFACTURING COMPANY, NOT INC., 1812 Winnemac Ave., Chicago 40, Ill. • In Canada: The Holden Co., Ltd, Montreal, Can.



A

Combination

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★ **DURABILITY** -- Three-month continuous runs without shut-down are common. Five years or more of heavy service without repair are frequently reported. Gorman-Rupps stay on the job!

★ **SIMPLICITY** -- Only one moving pump part - the impeller. No by-pass tubes or valves to make trouble. If maintenance is ever needed, it can be done in the field by unskilled labor with common tools. It's easy to keep a Gorman-Rupp running.

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★ **SELF-PRIMING** -- Start the engine and you start the water. That's all there is to it. No attention is needed. Electric drive models can be put on automatic operation.



Here's proof that Gorman-Rupp self-priming, centrifugal pumps are satisfactory! Order one and put it on the job for 30 days. If it isn't the best pump you ever used, we will take it back and it won't cost you a cent. Get yours now! There are no strings attached to this offer.

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18 YEARS--NO FAILURES!

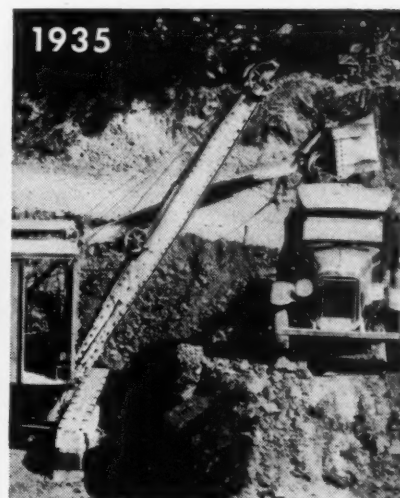
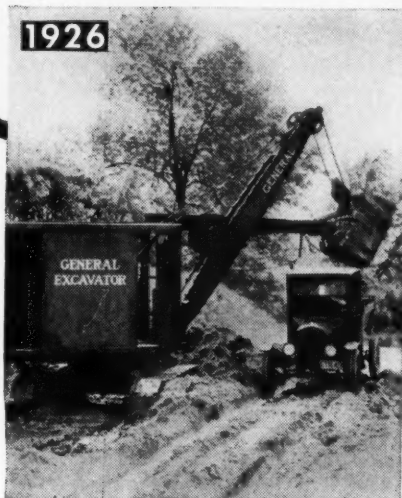
More than 98% of all the General Machines ever built are known to be still in service!*

General Excavators and Supercranes at every corner of the map are proving their indestructible stamina—on thousands of materials handling and digging jobs, military and civilian.

Virtually every General machine since the first built (and incidentally we can send you a very interesting performance history on that one!) is plugging away dependably today.

When Peace returns, bringing its great wave of new construction, Generals' dependability and all-around performance will be ready to help you raise your profit sights.

*Official records are incomplete on the other 2%, since many of them have passed from the hands of their original owners without General's knowledge.



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From the first act to the last of this cementing operation, ATLAS DURAPLASTIC steals the show!

An all-star bill—requires no additional materials; needs less water for a workable mix; reduces segregation and bleeding; makes better concrete at no extra cost!

Takes the chill off any audience — fortifies the concrete against freezing and thawing

weather! Has the hide of a seasoned trouper—resists scaling action due to use of de-icing salts!

Wins the praise of critics—makes concrete more durable, therefore is in for a record run!

For further information, write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.

OFFICES: New York, Chicago, Albany, Boston, Philadelphia, Pittsburgh, Cleveland, St. Louis, Minneapolis, Duluth, Kansas City, Des Moines, Birmingham, Waco.

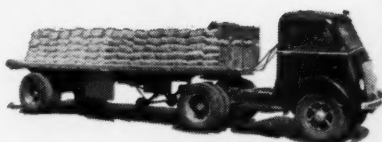
CM-D-17

ATLAS DURAPLASTIC

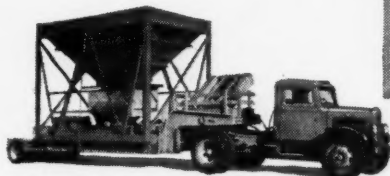
TRADE MARK REG.
U. A. C. CO.

The Air-Entraining Portland Cement That Makes Concrete More Durable and More Plastic

Dump models provide peak efficiency for hauling all kinds of construction materials



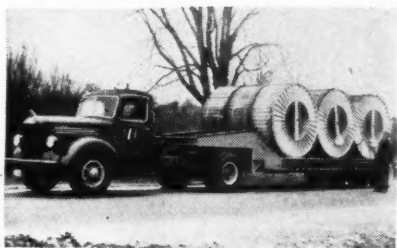
Platform models serve a wide variety of purposes—hauling all kinds of equipment.



Fruehauf Carryalls handle the heavy jobs with ease and economy.



Specially designed for hauling bulk cement—faster delivery and protection for the material.



Fruehauf Trailers cut hauling costs for contractors and suppliers everywhere.



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JOBS MOVE ahead faster with Fruehauf Trailers because of the greater flexibility of the Trailer method. Where the "shuttle" system is employed, only the Trailers—the load-carrying, detachable "bodies"—stand idle for loading or unloading. Truck and driver are constantly busy . . . there's no waiting, no lost motion.

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Name the job . . . and you'll find a Fruehauf Trailer engineered to handle it. Just give us a description of your particular hauling problem and let us submit our recommendations.

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It's almost unbelievable—until you see it for yourself—how Atkins Saws keep work moving at a fast pace.

Take circular blades for your portable power saws. They have what it takes to turn out faster, cleaner cuts and stand up under tough, day-after-day usage.

The same is true of all saws in the Atkins line. Each is designed for peak efficiency for its intended purpose. Each represents the best in saw steel, made with the finest workmanship. No wonder so many workmen team up with Atkins. They like the saws that keep cutting for longer periods of time . . . give more cuts per blade, with fewer time-outs for filing.



ATKINS CIRCULAR SAWS

The Atkins No. 37 Mitre Tooth Saw shown above is unsurpassed for general work. Used for portable power saws or saw tables, it is typical of the full line of Atkins Silver Steel Circular Saws. Each is famous for its ability to cut cleanly at high speeds, and turn out more work with less filing.

FOR EVERY JOB!

Atkins has the type and quality of saw to meet your every need. In addition to the saws shown, the Atkins line includes Hacksaws and Blades, Docking Saws, Hand Saws, Chain Saws and many special types. Find out about them now.

ATKINS CROSSCUT SAWS

Well-liked for heavy-duty cutting of timbers, piling, etc., Atkins One-Man and Two-Man Crosscut Saws are all made of the finest saw steel, which gives them unusual edge-holding qualities. Shown is the No. 392 Victor Chippewa One-Man Saw, a favorite with men who appreciate fine saws.



E. C. ATKINS AND COMPANY • 485 S. Illinois St., Indianapolis 9, Indiana

Agents and Dealers in All Principal Cities the World Over

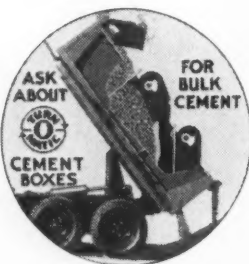


Manufacturers of Better Saws for Every Cutting Job



Only from Hercules do you get all these advantages for easy, low-cost, efficient operation and maintenance. For example—consider the fingertip controls which operate Hercules hoists and power take-offs. Pull out two buttons . . . up goes the body and the load is dumped. Push the same two buttons . . . the body slips down into road position. Simple, isn't it? And it's only one of a host of reasons why you'll want Hercules dump bodies for your postwar trucks.

Until you can get the new Hercules dump body you want, let your Hercules distributors keep your present equipment in running order. He will furnish the service you need.



TURN-O-MATIC CEMENT BOXES NOW AVAILABLE

Deliver cement at the right time, in perfect condition and without splash or dust, with Hercules Turn-O-Matic Cement Boxes. Immediate delivery. Write today.



HERCULES STEEL PRODUCTS COMPANY . . . GALION, OHIO

✓ PISTON-TYPE CONTROL VALVE

✓ CENTER-LIFT HOIST

✓ REVERSIBLE TAIL- GATE HARDWARE

✓ EASY-REACH TAIL- GATE LEVER

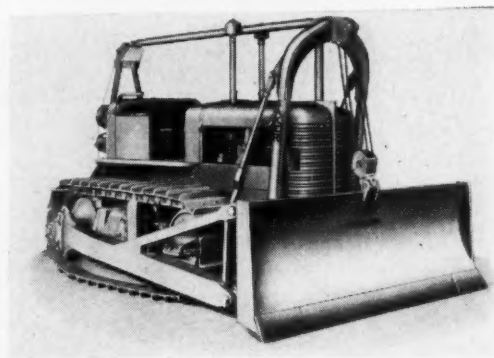
✓ HOIST MOUNTS ABOVE FRAME

✓ ACCESSIBLE HOIST CYLINDER

✓ PATENTED TIRE AND TOOL PACK

✓ DASH CONTROLS FOR HOIST AND TAKE-OFF

CABLE-CONTROLLED HYDRAULIC BULLDOZERS AND GRADEBUILDERS designed for use with Allis-Chalmers crawler tractors include the following features: Sturdy reinforced tubular arch; ruggedly constructed box-welded moldboard; five-position side arms which permit tilting of blade up to 10 in. on the bulldozer and 12 in. on the gradebuilder from a perpendicular position; 42-in.

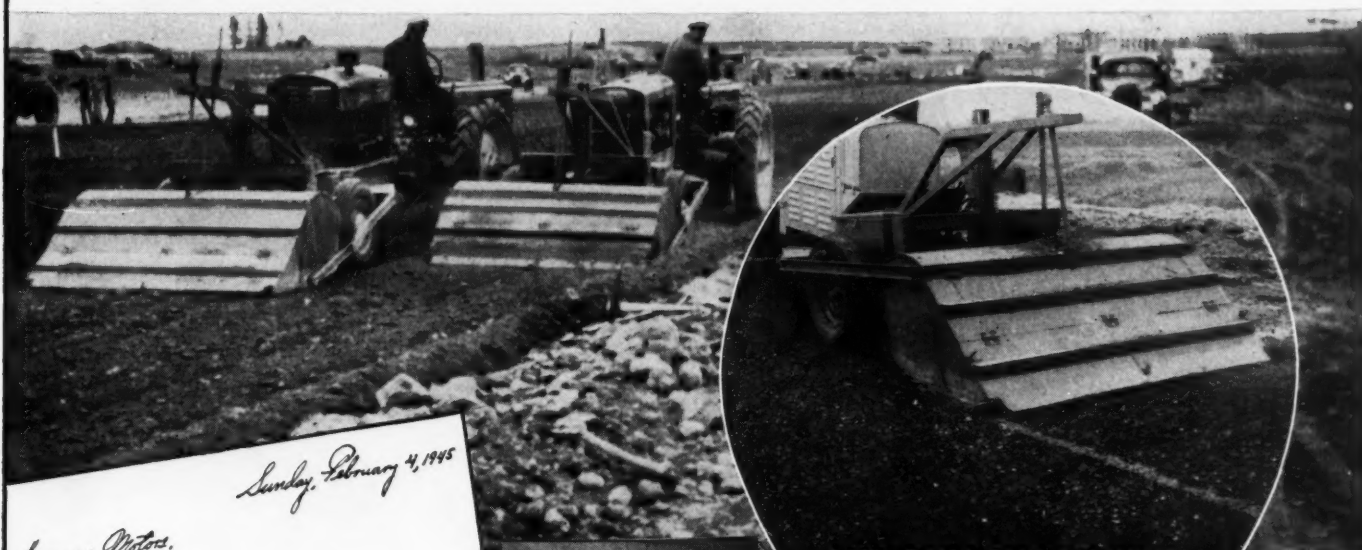


blade lift above ground on bulldozer, 50-in. on gradebuilder; blade drop above ground level limited only by length of cable. Built with single and double drum rear end power control units and single drum front end power control units, featuring differential or self-energizing brakes, the dead end load assisting the spring in setting the brake, the differential factor increasing as band lining wears. "Air-conditioned" cone-type clutches and band brakes are employed. All adjustments are made from rear. Drum barrel has curved contour at anchor end of drum which assists rope in winding closely from start.—The Baker Manufacturing Co., Springfield, Ill.

Clark
PORTABLE
ELECTRIC TOOLS

JAS. CLARK, JR. ELECTRIC COMPANY
624 Bergman St., Louisville 3, Ky.

THERE'S PROFIT IN A "STANDBY" SEAMAN MIXER



LEFT—Fleet of Seaman Mixers on airfield project. CIRCLE—Typical "job-use"—repair of small section of secondary highway.

Seaman Motors,
Milwaukee, Wis.

Gentlemen:

Here on the Southwest Pacific, soil is the only road and runway material. My task with the Army Engineers is making and running design.

Men of this unit have had copies of your Bulletin C-24 in their possession. It answers many a question that confronts me. Are copies of the Bulletin available at this date? If so, would you forward two copies to the address listed below. Certainly they would be appreciated.

Sincerely,

5/5/45
M. C. 934 Eng. Cont. Bp. (Am.)
600 322 P. M. San Juan

P.S. Air mail would save two months in mailing time.

SOIL STABILIZATION METHODS

Here's the booklet "Soil Stabilization Methods" referred to in the Sergeant's letter. A copy is yours without charge. Just write and ask for Bulletin C-24.

Highway Departments, Road Construction Contractors and Airfield Operators Often Find an EXTRA Seaman is Essential.

There is "project-use" and then there's "job use" for the Seaman Mixer,—and there's a sharp difference between them! In project-use,—the construction of large sections of roads, runways or extensive parking areas,—often a fleet of Seamans will be kept busy . . . Job-use, on the other hand, might well include the repair of stabilized or bituminous roads, shoulder widening and stabilization, leveling rough or uneven areas on turf airfields, preparing roadside mulches and grass seed-beds,—clearing land of brush, roots and weeds and pulverizing hard, frozen snow drifts on highways and airfields,—to name but a few. Notice that those are all jobs that often occur where larger work may be keeping the regular Seaman Mixer busy. And if a "standby" Seaman is not on hand, those are jobs that either will be left unattended —or performed by less efficient, far more costly methods. So, from now on,—get an extra profit with a "standby" Seaman Mixer.

THANK YOU, Sergeant—WE'RE GLAD TO BE OF HELP

It has been the steadfast policy of Seaman Motors to provide practical current engineering information to those in the highway and airfield construction field. Such information is by no means restricted to the use of the Seaman Mixer but concerns itself with any phase of such construction which appears to be of value. Letters such as these are gratifying,—for we feel that our effort to render an "extra service" is of practical use.

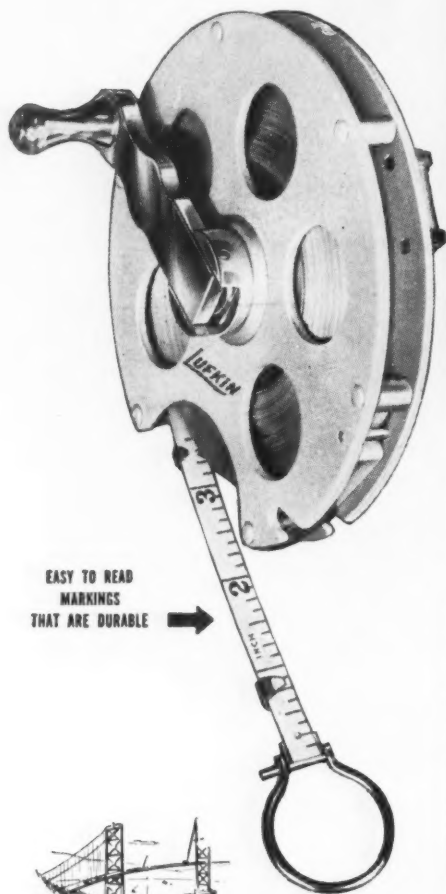
C-108



SEAMAN MOTORS

Milwaukee 3, Wisconsin

HERE'S A TAPE FOR ALL KINDS OF CONSTRUCTION WORK



EASY TO READ
MARKINGS
THAT ARE DURABLE →

Lufkin "Wolverine" Chrome Clad Steel Tapes

It's accurate, easy to read, and durable. It's made to stand the knock-about pace of construction work. The extra strong $\frac{1}{4}$ " line is built up by plating and covered with chrome. It can be dragged, scuffed, and twisted — yet the smooth surface will not crack, chip, or peel. Jet black markings are recessed into this non-glare "life-jacket" — permanently easy to read. Rust-proof disk reel with one-piece winding handle. See the "Wolverine" tape at your dealer's. Write for free catalog. THE LUFKIN RULE CO., SAGINAW, MICHIGAN, NEW YORK CITY.

LUFKIN
FOR ACCURACY

SWINGING LOADER called "Fleetfoot," is equipped with 180-deg. swinging boom which enables it to load trucks from either side without backing or turning entire machine. Crowding, hoisting, swinging and dumping are accomplished in one rapid continuous movement. Power-controlled buckets



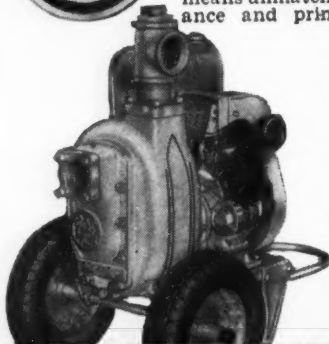
enable operator to control dumping as desired and to close bucket while it is being returned to loading position. Two speeds for boom operation are available, independent or traction. As no maneuvering is required, machine can work alongside trucks in alleys or crowded places. Swinging boom enables machine to dig outside its wheels when used as an excavator. With 65-hp. gasoline or diesel engine, front wheel drive through pneumatic-tired wheels which carry 80 percent of load and low gear traction speed of $\frac{3}{4}$ mph., crowding power is ample to load any
(Continued on page 142)



They Can Take It
DUAL PRIMERS



When it comes to DURABILITY, CMC Dual Primers have the "guts" to stand up to those tough, steady 24-hour grinds. DUAL PRIME means unmatched performance and priming speed.



A husky 3" CMC Dual Prime. One of the complete line from $1\frac{1}{2}$ " to 10" sizes. Also 3" and 4" Diaphragms. Get catalog.

CONSTRUCTION MACHINERY CO.
Waterloo, Iowa

Mixers • Pumps • Hoists • Batching & Placing Equipment • Saws • Carts • Barrows

Look for the  **ARMSTRONG BROS.**
BETTER PIPE TOOLS



Threads of Lathe-cut Smoothness

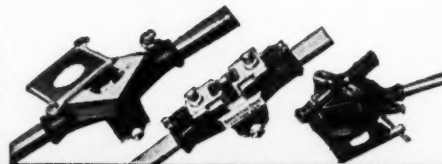
Machined from special oil-tempered Chrome-Vanadium Tool Steel, with hob-cut teeth "backed-off" from their ground cutting points; with accurately figured cutting angles and chaser rakes and ample chip clearance, these finer dies produce threads of lathe cut smoothness. They cut freely, faster, without drag and spin off the pipe without tearing or jamming.

Hardened, drawn, tempered and tested, they hold their keenness and free-cutting qualities.

They fit all standard made Stocks or Threaders—"Adjustable," "Receding" or "Solid"—come in all pipe sizes from $\frac{1}{4}$ " to 2".

ARMSTRONG BROS. Stock and Receding Threaders are improved in design, accurately balanced and machined inside and out.

Write for Catalog



ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
334 N. FRANCISCO AVE. • CHICAGO, U.S.A.

Eastern Sales Office: 199 Lafayette St., N. Y. 12
Pacific Coast Whse. & Sales Office
1275 Mission St., San Francisco 3, Calif.



☆ The complete Cleveland line includes the *right* model for every job—whether it's paving breaking, demolition work, frost breaking, ripping up foundations or masonry, breaking shale and hard ground, etc. Make your choice from: (1) The 80 lb. C7, best for average work; two run from a No. 85 compressor. (2) The 82 lb. C7, a slugger for the hardest work; two run from a No. 85 compressor. (3) The 35 lb. C10, a smaller tool for lighter work; three run from a No. 85 compressor. (4) The 58 lb. C11, with long stroke and heavy, slugging blow. Two run from a No. 85 compressor. All these Cleveland models have *always* been air cushioned.

To help you further there are "Cleveloy" armor-plated chisels, moils and tools; durable "Veribest" air hose and Cleveland quick-acting hose couplings.

Write for Bulletin 128 on Cleveland Paving Breakers

BRANCH OFFICES

Birmingham 1, Ala.	Lexington 19, Ky.	Salt Lake City 1, Utah
Butte, Mont.	Los Angeles 11, Calif.	San Francisco 3, Calif.
Denver 2, Colo.	Newton Highlands 61, Mass.	St. Louis 3, Mo.
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CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.

The Cleveland Rock Drill Co.

Division of the Cleveland Pneumatic Tool Company

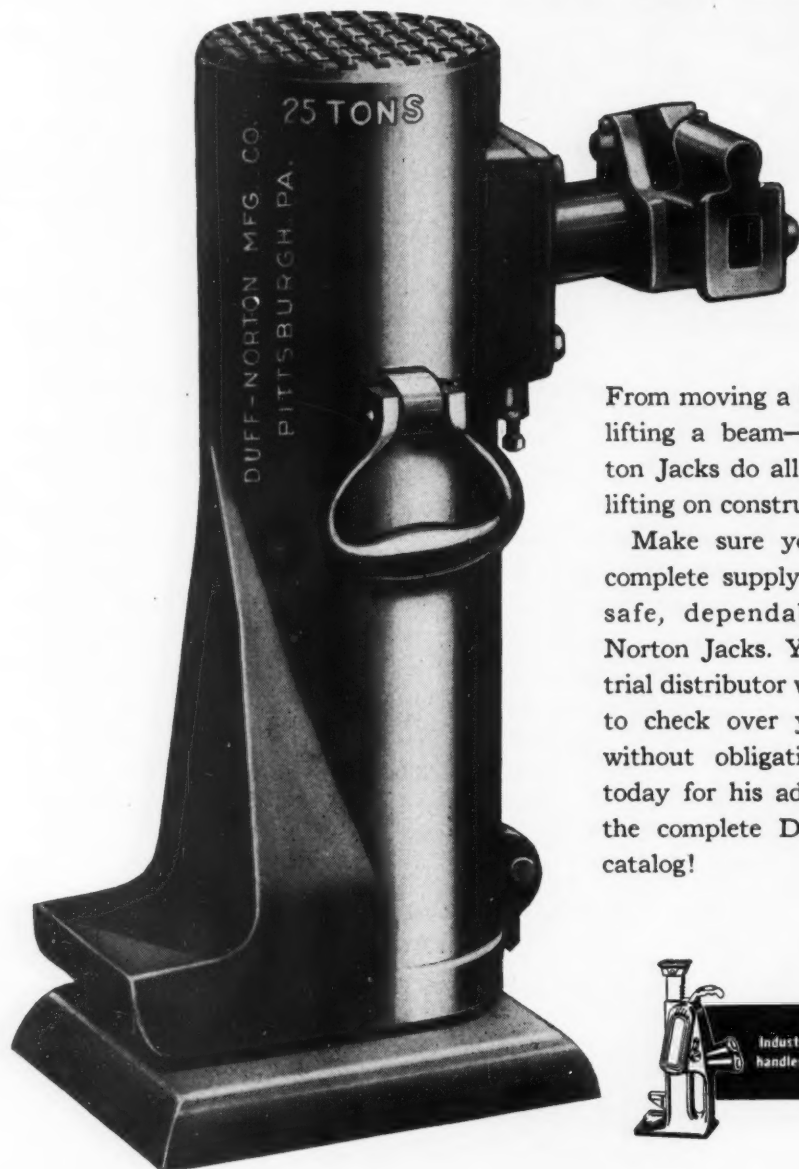
CLEVELAND 5, OHIO

BRANCH OFFICES IN PRINCIPAL CITIES AND MINING CENTERS

★ LEADERS IN DRILLING EQUIPMENT ★

DUFF-NORTON JACKS

FOR EVERY LIFTING JOB



From moving a building to lifting a beam—Duff-Norton Jacks do all the heavy lifting on construction jobs.

Make sure you have a complete supply of husky, safe, dependable Duff-Norton Jacks. Your industrial distributor will be glad to check over your stock without obligation. Write today for his address, and the complete Duff-Norton catalog!



Your
Industrial Distributor
handles DUFF-NORTON
JACKS

THE DUFF-NORTON MANUFACTURING CO.
PITTSBURGH, PA.

Canadian Plant:
COATICOOK, QUEBEC

Representatives in
Principal Cities

(Continued from page 140)

material, do grading, backfilling and light excavating and serve as prime mover for trucks and freight cars. Six forward and six reverse speeds up to 15 mph. enable machine to travel to and from job under its own power. Vickers power steering is standard. Mobility plus use of quickly interchangeable 1/2- to 2-cu. yd. buckets, enable unit to handle stone, earth, brick, coal, snow and cinders, to dig, load and level materials and to take part in clean-up work and emergency service on washouts and landslides. With crane boom up to 25-ft. length which can be installed as an attachment, machine may be used for pipe laying, form handling, pole setting and light steel erection. Cable-controlled blade for light bulldozing is also available.—Jaeger Machine Co., Columbus, Ohio.

★ ★ ★

NEW GROUTING AND PATCHING AID in repointing mortar joints, sealing pre-cast pipe joints and for similar uses, when mixed as a grout expands upon oxidation and overcomes natural tendency of concrete toward shrinkage. As a result of this action, vibration and shifting of machinery are eliminated by providing level contact between concrete and machine base; secure anchorage for bolts to be placed in concrete is provided by forming a non-shrink bond between bolt and concrete and structural and other columns are strengthened by producing a strong, load-bearing foundation that is resistant to high compression and impact. Use of Ferrolith "G," it is claimed, permits operation of machinery and use of bolts and other materials to which it is applied within 12 to 24 hr. after grouting.—Building Products Division, L. Sonneborn Sons, Inc., 88 Lexington Ave., New York 16, N. Y.



Speed-Up Overhaul!

As you know, the **FIRST** step in repairing or reconditioning your tractors, mixers, air compressors and similar construction equipment is thorough cleaning. Specially-designed Oakite materials speedily remove all oil, dirt, grease and muck to make inspection easier, more accurate and facilitate any needed repairs.

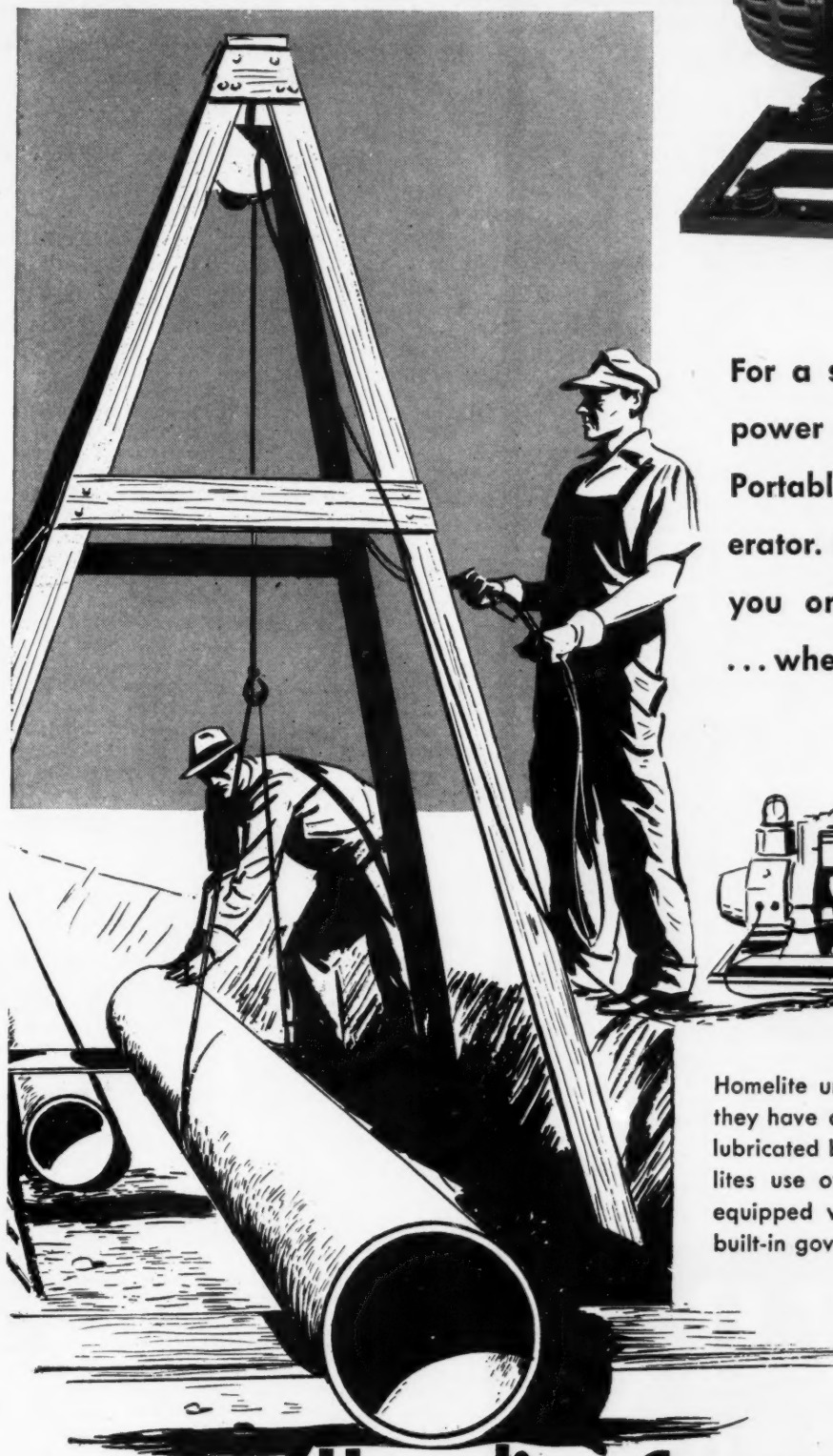
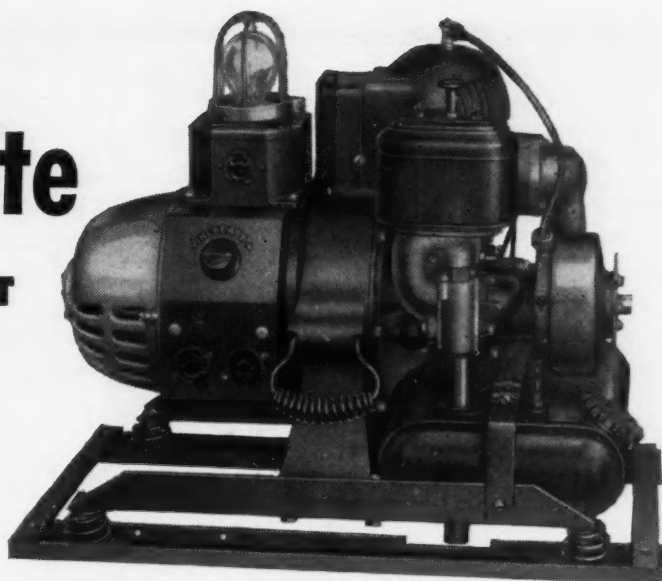
Also available are time-saving Oakite materials for paint stripping, radiator conditioning and many other essential jobs. Write **TODAY** for **FREE** booklet giving full details!

OAKITE PRODUCTS, INC.
24G Thames Street, New York 6, N. Y.
Technical Service Representatives Located in All
Principal Cities of the United States and Canada

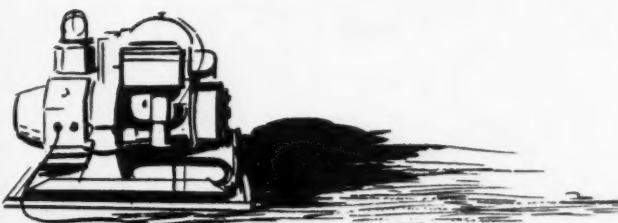
OAKITE
Specialized **CLEANING**

Pick Up a Homelite

AND GIVE YOUR MEN A LIFT



For a swift lift in laying pipes use a power hoist operated by a Homelite Portable Gasoline-Engine-Driven Generator. Easily portable, a Homelite gives you on-the-spot power... 2000 watts ... wherever and whenever you need it.



Homelite units cost less to use and maintain because they have a cool running engine that is automatically lubricated by oil which is always new. Moreover, Homelites use oversize ball bearings throughout and are equipped with a simplified magneto and automatic built-in governor.

Homelite Corporation

Portable PUMPS • GENERATORS • BLOWERS
PORT CHESTER, NEW YORK

1901 HORIZONTAL TYPE GASOLINE ENGINE 	1902 CUBA 	1903 KITTY HAWK 	1904 MEET ME IN ST. LOUIS
1905 	1906 CONFERENCE ON PANAMA CANAL 	1907 CARRIE NATION 	1908 FINANCIAL PANIC
1909 BLERIOT CROSSED ENGLISH CHANNEL 	1910 NOVO VERTICAL GASOLINE ENGINE 	1911 NOVO DIAPHRAGM PUMP 	1912 TITANIC
1913 HAGUE 	1914 WORLD WAR I 	1915 LUSITANIA 	1916 THEY SHALL NOT PASS VERDUN
1917 U.S. ENTERS WORLD WAR I 	1918 ARMISTICE 	1919 PROHIBITION 	1920 WOMAN SUFFRAGE
1921 ARMS LIMITATION 	1922 TEA POT DOME 	1923 PUTSCH! MUNICH 	1924 LENIN DIES
1925 9 POWER TREATY 	1926 VALENTINO DIES 	1927 LINDBERGH 	1928 NOVO INDUSTRIAL ENGINES
1929 N.Y. STOCK EXCHANGE 	1930 RHINELAND 	1931 WAR DEBTS CANCELLED 	1932 LINDBERGH KIDNAPPING
1933 BANK CLOSED 	1934 INVASION ETHIOPIA 	1935 VERSAILLES TREATY 	1936 NOVO PAVEMENT BREAKER
1937 HINDENBERG DISASTER 	1938 NOVO DIAPHRAGM PUMPS 	1939 NOVO SELF-PRIMING CENTRIFUGAL PUMPS 	1940 FRANCE FALLS
1941 REMEMBER PEARL HARBOR 	1942 DIEPPE RAID 	1943 TEHERAN 	1944 4TH TERM
1945 EXTRA V-E DAY 	1946 	1947 	1948
1949 ENGINES HOISTS 	<div style="text-align: center;"> <h1>NOVO</h1> <h2>ENGINE CO.</h2> <h3>LANSING 5, MICHIGAN</h3> </div>		
1953 COMPRESSORS GENERATOR SETS PUMP-OUT BREAKERS 			

NEWS FROM MANUFACTURERS

About Their Products

The publications reviewed below will keep you posted on latest developments in construction equipment and materials available for your use.

COLOR SELECTION FOR INDUSTRIAL INTERIORS

—The Arco Co., Cleveland, Ohio. (18 pp., illustrated) Color selection guide, which permits persons without detailed technical understanding of color science to specify correct color shades that minimize fatigue and promote safety, has been developed for use in industrial, commercial and institutional interiors, enabling any one confronted with a painting job of this type to make his own selections on a scientific basis thus assuring the maximum benefits obtainable through the use of color. First eight rules specify use of colors to compensate for deficiencies in natural and artificial light which is limited by direction of window exposure and type of electric lamps used. The remaining rules guide choice of shades for work areas, machinery and building equipment on a basis of measured contrasts and reflection value, as well as the selection of more colorful combinations for corridors, cafeterias and other occasionally used employee facilities where contrast with prevailing plant colors encourages relaxation and relieves fatigue. Available to those executives who wish to make a scientific color selection for painted interiors.

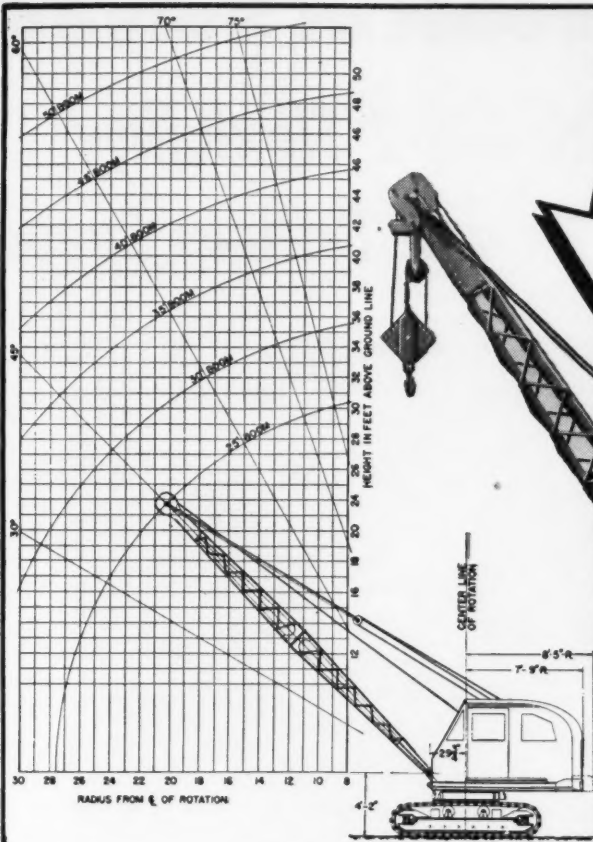
★ ★ ★

PLASTIC COATING—Amercoat Div., American Pipe and Construction Co., P.O. Box 3428, Terminal Annex, Los Angeles 54, Calif. (4-p. folder) Many practical suggestions for eliminating corrosion and contamination are to be found in this bulletin which describes the various proved uses of Amercoat No. 23, a general purpose, cold applied plastic coating in a wide range of industries. Technical features and product advantages also are covered in detail.

★ ★ ★

RESIN GLUE FOR WOOD BONDING—Bakelite Corp., 30 E. 42nd St., New York 17, N. Y. (8 pp., illustrated) Written expressly to acquaint plywood and furniture manufacturers with the properties of this newest of the phenolic glues, a cold-setting phenolic-resorcinol product which provides maximum water resistance for exterior plywood applications, booklet explains formulations, mixing procedure, working life of glue, spreading, assembly, curing, cleaning and storage. Illustrated with graphs that show pot life, assembly times, and clamp periods. This glue was specifically developed to meet demands for a cold-setting phenolic resin glue for the lamination of heavy lumber, beams, arches and ships' timbers.

**AN EASIER HANDLING
EASIER OPERATING
CRAWLER-
SPEEDS
EVERY JOB!**

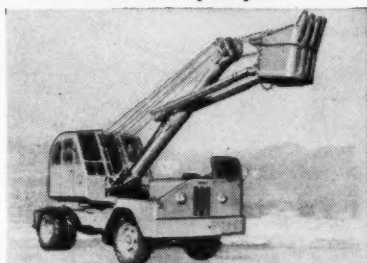


**MODEL C-16
CRANE CAPACITY CHART**

Boom Length	Radius in Feet	Standard C' Weigh	1000 lb. Extra C' Weigh	2000 lb. Extra C' Weigh	1400 lb. Rear C' Weigh	Rear C'wt. +1000 lb. C' Weigh	Rear C'wt. +2000 lb. C' Weigh
25 ft. Boom	10	12,550	14,000	15,500	14,700	16,200	18,000
	12	9,580	10,750	11,900	11,290	12,740	13,500
	14	7,780	8,680	9,600	9,120	10,020	11,400
	16	6,530	7,280	8,000	7,660	8,420	9,200
	18	5,620	6,270	6,900	6,610	7,260	7,900
	20	4,950	5,550	6,100	5,810	6,380	6,900
	22	4,420	4,920	5,400	5,180	5,690	6,200
	25	3,780	4,230	4,700	4,460	4,900	5,300



**Model TLDT-20 Truck-type Crane,
12-ton capacity**



**Model T-6-K Truck-type 3/8-yard Shovel,
6 to 8 ton Crane. Completely convertible.**

MODEL C-16 MICHIGAN 1/2-YARD CRAWLER-CRANE

Faster production, greater operating ease, lower costs on all types of crane work—that's what owners and operators get with this combination of job-proven MICHIGAN-built crawler unit plus the air-controlled mechanism of the world-famous Michigan Truck-Type Shovel-Crane . . .



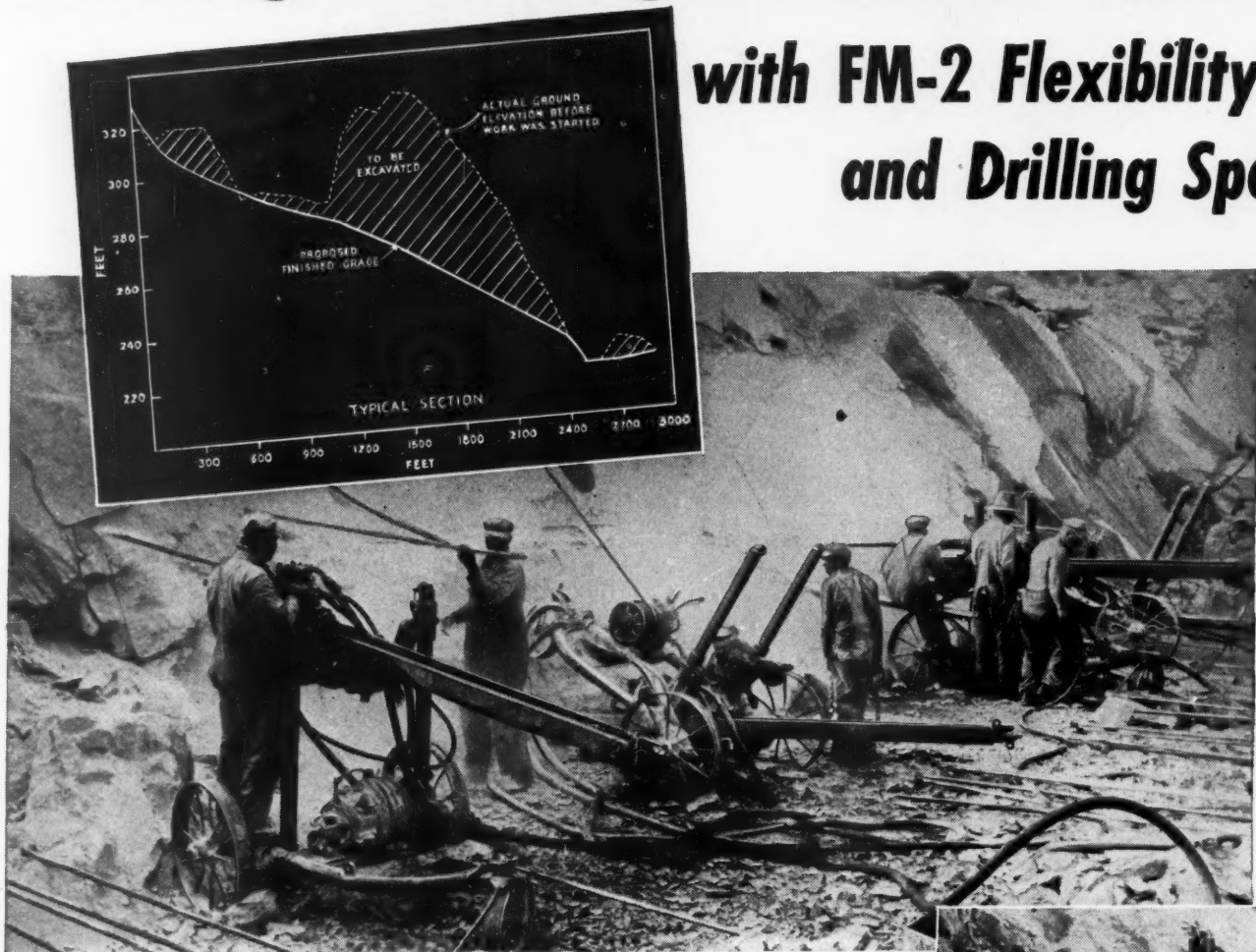
The complete story about Model C-16's tractor steering, simultaneous travel-hoist-swing-crowd, quick convertibility, finger-tip air-controlled clutches — and many other time-saving, profit-earning MICHIGAN features — is given in Bulletin E-75. Write today.

MICHIGAN

POWER SHOVEL COMPANY

BENTON HARBOR, MICHIGAN

A Tough Drilling Problem Solved with FM-2 Flexibility and Drilling Speed



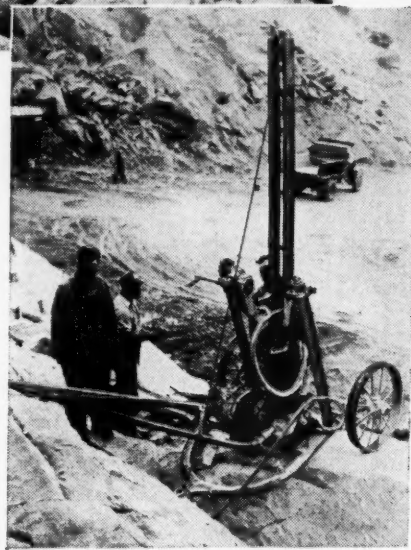
Building a suitable spillway for Dreher Shoals Dam required the excavation of 675,000 cubic yards of rock. This rock varied in hardness from granite to soft mica schist. The formation was turned up on end so that the seams were vertical. The contour of the ground, as shown in the diagram, was extremely steep.

The A. I. Savin Construction Co. of East Hartford, Conn., chose eleven FM-2 Wagon Drills for this tough job because these machines will drill holes at any angle and have the light weight required for flexibility. Their maneuverability was further increased by Ingersoll-Rand air hoists attached to the frames.

These mountings were equipped with the famous X71-WD drill. This machine, with its extremely long stroke and the heaviest piston used in any hammer drill, hits a powerful blow. It also has a unique follow-through characteristic that overcomes the inertia of long, heavy drill steel. The resulting strong rotation was ideal for fast drilling in this difficult rock formation.

Then too, the air motor feed, which has a range of feeding pressure from 0 to 1000 lbs., enabled the operators to select the right feed for the varying rock conditions.

As is typical of the experiences of all FM-2 wagon drill users throughout the country, Mr. Savin was able to obtain a very good yield of broken rock per pound of dynamite. His costs were low, and the job went along without a hitch. FM-2's on your construction job or in your quarry will give you the same dependability, fast drilling, and economy.



FM-2 flexibility permits the proper spacing of holes for most efficient blasting. More than 90% of the rock broken was small enough to pass through the bucket of a 1¾-yard shovel.



Ingersoll-Rand

11 Broadway, New York 4, N. Y.

5-628

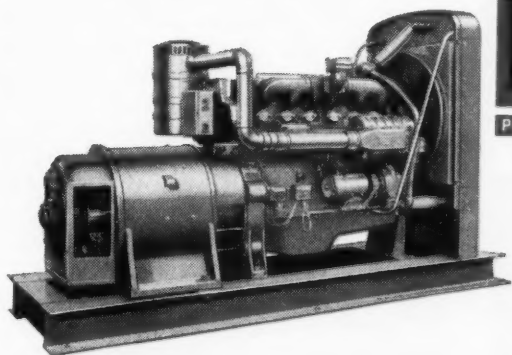
COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • OIL AND GAS ENGINES

BIG POWER in a
SMALL PACKAGE because of

Supercharging



This Buda Diesel Generating Set, with a capacity of 147 H.P., powers the gantry crane shown above, built by the Washington Iron Works, Seattle, Washington.



ENGINEERING



PRODUCTION

This revolving gantry crane, taller than a two-story building, has greater capacity, smoother performance, and faster operation because of the B-W Supercharger engineered into its Diesel-driven generator.

The principle back of supercharging is very simple. Neither air nor fuel of itself makes a combustible mixture. Both must be mixed in proper proportion. It follows that as more air is supplied by supercharging more fuel can be burned, and more power developed. In many cases this has meant a net gain in usable brake horsepower of between 30 and 35 per cent over the same engine unsupercharged.

It is this increase in net horsepower, as well as improved performance at higher altitudes, and, in the case of two-cycle engines, better scavenging, that lies behind the ever widening use of B-W Supercharging in the marine, industrial, construction, transportation, and heavy-duty automotive fields.

The story is completely described in a handsome new brochure that is just off the press. We'll gladly send you a copy.

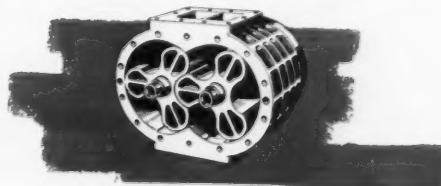
SUPERCHARGERS, Inc.

● DIVISION OF BORG-WARNER

3412 WEST CAPITOL DRIVE

Milwaukee 9, Wisconsin

The B-W Positive Displacement Supercharger is closely sealed and precision-built for efficient and reliable operation.



WHERE **BETTER DESIGN**
and
PRECISION CONSTRUCTION

BETTER HEAD PROTECTION!

M.S.A. Skullgard

Providing easy wearing comfort and solid head protection on construction projects everywhere, M.S.A. Skullgard is distinguished by many exclusive design and construction features, including: the use of *high-pressure molded laminated bakelite*, with tremendous resistance to fracture and a high dielectric strength; *deep-curved crown*, providing extra clearance between hat and top of head, *uniform thickness* throughout crown and brim of hat; light weight!

With flexible sweatband, shock-absorbing inner cradle, and air spaces between sweatband and shell of hat, Skullgard is cool and comfortable to wear. It is tough and durable, completely unaffected by contact with water, grease, perspiration and common chemicals. Write for the Skullgard facts in Bulletin DK-11.



MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STREETS

PITTSBURGH 8, PENNA.

District Representatives in Principal Cities

WELDING MILD STEEL—The Lincoln Electric Co., Cleveland, Ohio (48 pp., illustrated) Describes and illustrates new methods of increasing speed of welding mild steel called "Fleet-Welding" and also of cutting costs as much as 59 percent. Ways in which this method utilizes the benefits of "arc force" to obtain greater penetration and the required weld strength also are brought out. Some of the subjects covered. Using "arc force" to increase welding speed; effect of penetration on welding costs; cost reduction with "Fleet-Welding"; factors affecting production speed and general information for use of procedure tables. Also carries complete information with corrective suggestions on procedures used for butt welds, fillet and lap welds. Several pages devoted to procedures used in welding 18- to 10-gage sheet metal with tables giving electrode type and size, electrode polarity, current, arc speed, pounds of electrode per foot of weld and recommended fit-up for butt welds, fillet welds, lap welds, corner welds and edge welds.

★ ★ ★

SAFETY CLOTHING FOR MALE WELDERS—American Optical Co., Southbridge, Mass. Lists and describes various types of clothing including overalls, all-leather pants, hot weather pants, chaps, aprons, coats, cape sleeves and bib, short jacket, sleeves and sleevelets, gloves, mittens and spats, and providing over-all protection against flying sparks, thereby helping to prevent painful skin burns and tending to reduce accident frequency. Patterns for this safety clothing were developed by an expert designer of men's clothes, working in conjunction with a practical experienced welder.

★ ★ ★

LONG-CENTER

BELT CONVEYOR

FLIGHTS

RECENT DEVELOPMENTS have greatly augmented the possibilities for use of long-center single belt conveyor flights, according to a recent paper by E. A. Mathias, Goodyear Tire & Rubber Co., before the Materials Handling Machinery Manufacturers Conference at the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Mr. Mathias spoke as follows:

"At Grand Coulee Dam, Goodyear engineered and supplied a 60-in.-wide belt operating on 4,985-ft. centers. After completing the job at Grand Coulee, this 80-ton belt was moved to the cement plant of the Permanente Corp. near San Jose, Calif., and installed on 4,100-ft. centers, where it is now operating.

"Recently we have developed a conveyor belt construction wherein steel cables replace cotton duck or cords as the strength carrying members. Our steel cable conveyor belts can be made to have

(Continued on page 150)

WHICH **Oil** GOES INTO YOUR ENGINES?



A LAZY OIL
that only lubricates

DON'T be too quick to blame your engines if they're not turning in the kind of performance they should. It may be your oil is "laying down on the job." For an oil that's lazy . . . doesn't do its full quota of work . . . can cause plenty of engine trouble.

Quite a few operators who have a wartime obligation to fill are taking no chances . . . have switched to hard working Shell Talpex, the oil that does all the jobs necessary to keep engines running at peak efficiency.

If the oil you now use is not doing all these jobs, it's lazy—should be changed to hard-working Talpex. Ask the Shell man to show you why.

Shell Oil Company, Inc., 50 West 50th Street, New York 20, N. Y.—100 Bush Street, San Francisco 6, California.



TALPEX

THE ALL-PURPOSE,
HEAVY-DUTY LUBRICANT

For trucks, buses, tractors, shovels,
stationary and marine Diesels

... **OR**
HARD-WORKING

TALPEX

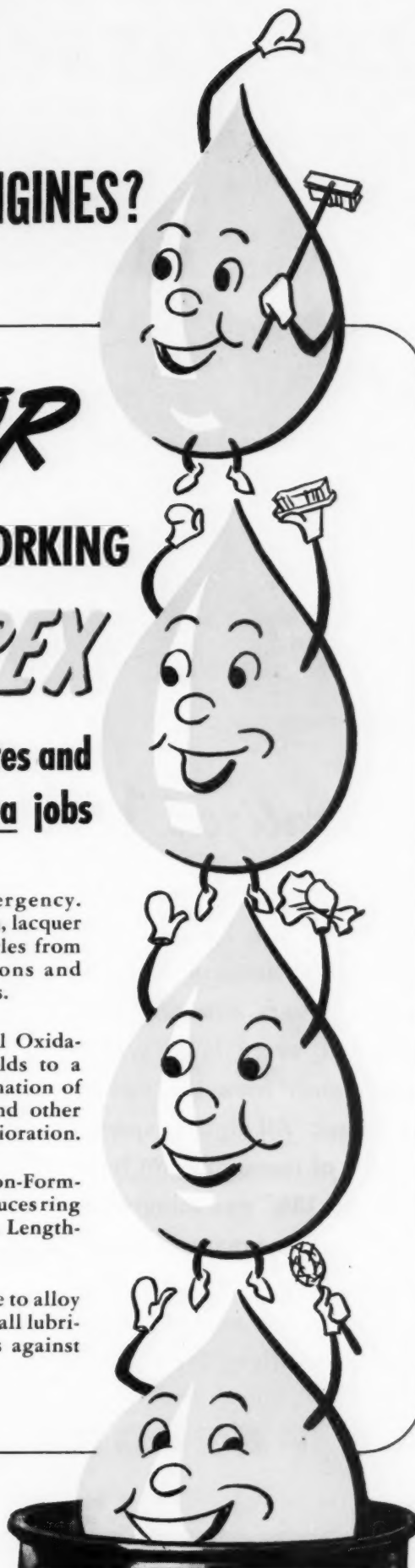
**that lubricates and
does 4 extra jobs**

1. Has high detergency. Helps keep carbon, lacquer and foreign particles from adhering to pistons and rings, valves, ports.

2. Has exceptional Oxidation Stability. Holds to a minimum the formation of sludge, lacquer and other products of deterioration.

3. Has low Carbon-Forming Tendency. Reduces ring sticking and wear. Lengthens engine life.

4. Is non-corrosive to alloy bearings. Protects all lubricated engine parts against corrosion.

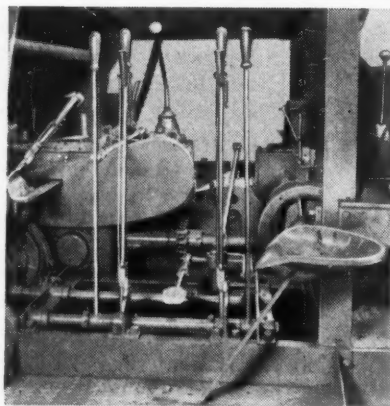


PARSONS 250 TRENCHLINER



Centralized 1-MAN CONTROLS

One man controls all operations of the Parsons 250 Trenchliner because all operating levers are centrally grouped, every lever within easy reach from the operator's seat. All digging speeds . . . 25 of them, ranging from 2½" to 136" per minute . . . and all 5 conveyor belt and bucket line speeds are controlled by the centrally located, convenient lever bank.



All operating levers are within easy reach of the operator on the Parsons 250 Trenchliner.

THE PARSONS COMPANY

KOEHRING SUBSIDIARY NEWTON, IOWA

TRENCHING EQUIPMENT



(Continued from page 148)

strength equivalent to 60 plies of heavy cotton belt duck and yet not exceed conventional belt thickness. This new steel cable construction makes it possible to operate a fully loaded belt on centers up to 5 or 6 mi. in horizontal runs."

★ ★ ★

Tractor-Dragline

(Continued from page 71)

and down as a result of travel over uneven ground. Center of gravity of the tractor with crane attached is little above the center of gravity of the stripped tractor, a fact which contributes to the stability of the combination unit.

On the Kuckenberg contract, the tractor dragline was equipped with a 30-ft. boom, including a 10-ft. pin-connected intermediate section. As the tractor was not carrying a bulldozer, which ordinarily would serve to counterbalance the rear-end crane, counterweights totaling 7,000 lb. were mounted over the tracks alongside the tractor motor.

With the hoist mounted on the back of the tractor in a relatively low position, the dragline fairlead was near enough to the ground for effective digging with the dragline bucket. The operator, seated above the fender of the tractor facing the boom, enjoyed relatively good visibility. Controls are similar to those of a conventional excavator. The boom can swing 120 deg. each side of center, a total of 240 deg., or two-thirds of a circle.

Other Attachments

Free-spooling drums of the hoist, which is not a worm drive unit, are well adapted to operation of dragline, clamshell, boom-and-dipper shovel, and other types of excavator attachments. The crane used by the Kuckenberg Construction Co. can handle a ¾-yd. digging clamshell, and piledriver leads can be mounted on the boom. For handling lighter loads at longer radius, the boom can be extended with a 15-ft. jib.

In addition to the present crane-dragline unit, the manufacturer is completing plans to furnish also shovel, trench hoe and skimmer attachments.

Robert C. Shoemaker, supervising engineer of construction machinery for the Hyster Co., Portland, Ore., invented and developed the Hystaway tractor crane. The other attachments also are designed by him.

YOU CAN PROFITABLY HANDLE BOTH

Long & Short Hauls

with **TOURNAPULLS**



Actual job time studies show you why the country's leading contractors are using Tournapulls to increase hourly production on ALL haul lengths:

1,800 FEET ONE WAY

Hourly pay yds. per unit	120
Tournapulls in fleet	6
Material	sandy gravel
Job	Janesville, Wisc., Airport
Contractor	Raemisch-Madden Co.



2,600 FEET ONE WAY

Hourly pay yds. per unit	84
Tournapulls in fleet	13
Material	dredged ocean sand
Job	Idlewild, New York, Airport
Contractor	Circle Construction Corp.



16,000 FEET ONE WAY

Hourly pay yds. per unit	25
Tournapulls in fleet	11
Material	wet pit-run gravel
Job	sub-base for Illinois Hwy.
Contractor	Raemisch-Madden Co.



4,000 FEET ONE WAY

Hourly pay yds. per unit	72
Tournapulls in fleet	4
Material	sandy loam
Job	Goleta, Calif., Airport
Contractor	A. Teichert & Sons

700 FEET ONE WAY

Hourly pay yds. per unit	112
Tournapulls in fleet	4
Material	shale, 40% voids in load
Job	relocation Pennsylvania Hwy.
Contractor	Potts & Callahan Contracting Co., Inc.

Like these successful dirmovers, you, too, can handle both long and short hauls with fast, powerful rubber-tired Tournapulls. Let your LeTourneau distributor help you figure your next job on the basis of low-cost

Tournapull performance.

See him TODAY!

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LETOURNEAU
PEORIA, ILLINOIS • STOCKTON, CALIFORNIA



TOURNAPULLS
Trade Mark Reg. U.S. Pat. Off.

FOR LOWEST NET COST PER YARD

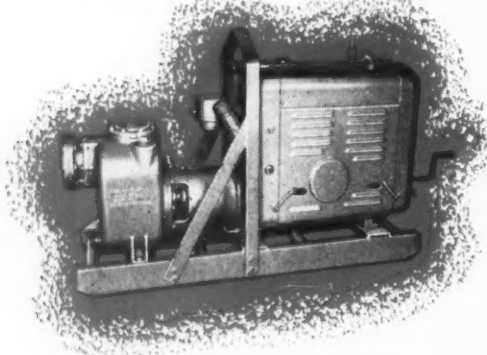


...how simple they are!

There are fewer parts in Carver pumps because every part does its job right. No gadgets have to be added to step up efficiency or correct faults. Impellers are scientifically designed with web-reinforced vanes confining wear to but one side. Renewable liners carry a cast lug protecting the scroll casing at the impeller cut-off where wear is greatest. The wearing surface seal rings of the Carver Lifetime Seal are made of Tungsten Carbide—a material so hard it cuts glass like a diamond.

Every Carver Pump carries a "Certified" tag which means that it has been carefully tested and fully

meets our high standards for performance on the job. Write for details or see your local distributor.



**THE CARVER
PUMP CO.**
Muscatine, Iowa



Mile-a-Day

DITCHING

(Continued from page 79)

ent on the new or used equipment market are listed in an accompanying table which gives their principal dimensions and characteristics. Another table shows the digging and road speeds of a medium-size wheel-type trencher. All trenching machines have an adequate range of speeds to suit various digging conditions. Skill and experience of the operator are most important in making good use of these speeds.

Gasoline or Diesel?

Either gasoline or diesel power may be obtained on most new trenching machines purchased today. The gasoline engine offers an advantage in that it will stall if the machine strikes an obstruction or takes a heavy jolt. A diesel engine, because of its greater lugging power, will keep on pulling and, if not disengaged immediately, will twist off a shaft or break a chain.

Diesel engines solve the big headache of all contractors—gas stealing. After knocking-off time, the men all back up to the gas drum and help themselves. Many times I have said to them, "How about leaving a few gallons in the drum so at least we can start up in the morning?"

International's UD-9 diesel engine is just about perfect for trenchers, as it is not too heavy, will burn any kind of fuel oil, and has few parts, making it easy to overhaul. To start it the operator just pushes the starter button, counts ten, and the engine is operating on diesel fuel.

Crawler Tracks

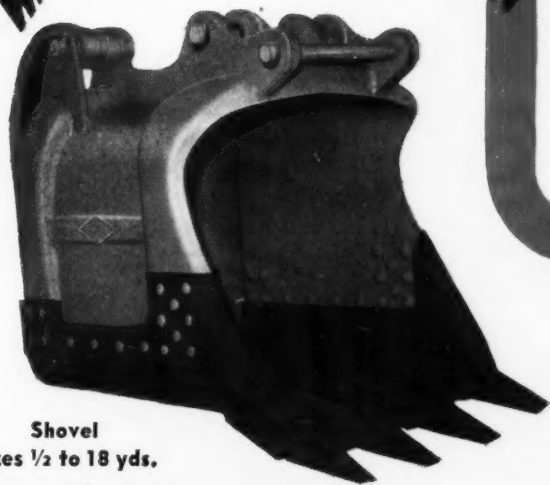
An inexperienced purchaser of a trenching machine is likely to find that his major trouble will be with the crawler tracks. Manufacturers of trenching machines contend that, because the machines are required to move only about a mile a day, a cast-steel track assembly,

(Continued on page 154)

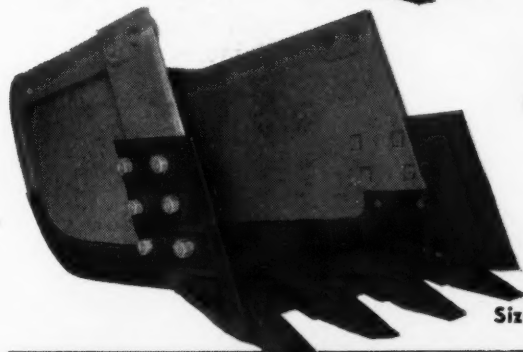
America's most complete line
of material handling buckets.



Clamshell
Sizes 1/2 to 2 yds.



Shovel
Sizes 1/2 to 18 yds.



Pullshovel
Sizes 1/2 and 3/4 yd.



Dragline
Sizes 1/2, 3/4,
1, 1 1/2, 2,
2 1/2 yds.

WE BUILD ALL

4

MATERIAL HANDLING BUCKETS



ALL PURPOSE

- SHOVEL
- PULLSHOVEL
- DRAGLINE
- CLAMSHELL

We build a wider and more complete line of material handling buckets than any other manufacturer. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

FRONTS, BOTTOMS, SCOOPS, and teeth, shown in red on buckets, are 14% manganese steel developing up to 120,000 tensile p.s.i. for long service life and hard abuse.

Experience Counts

See your shovel engineer or equipment dealer about PMCO Dippers and Buckets.



On the 1/2 yd. and 3/4 yd. Shovel, Pullshovel, and Dragline Buckets, all teeth are interchangeable . . . a great advantage to operators.

Quality Since 1880

PETTIBONE MULLIKEN CORP.

CHICAGO 51,
U. S. A.

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES.



Adaptable! Reclaimable!
ROLAGRIP
PIPE COUPLINGS



QUICKLY INSTALLED
 With Rolagrips, pipe lines can be laid on the ground, under the ground or in the water with assurance of leakproof connections. These simple, positive couplings not only are adaptable to the kind of line but also to the kind of pipe! Any plain end pipe is satisfactory, new or used. Since threading, grooving or flanging are eliminated, lighter weight pipe can be utilized. The gasket is simply stretched over the two pipe ends, centered over the joint and the halves of the housing bolted together without need of special tools.

100% RECLAIMABLE
 Rolagrip Couplings may be completely salvaged and used on one job after another. This, in addition to flexibility and shock-resistance, combines to make them ideal for temporary as well as permanent lines.




GUSTIN-BACON MFG. CO.

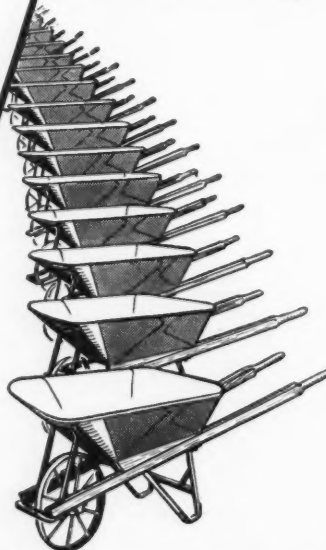
KANSAS CITY 7, MISSOURI

New York • Philadelphia • Chicago • Tulsa • Houston • Fort Worth • San Francisco

*Sterlings too,
are helping
to win* **Victory**

Regiments of sturdy pre-war Sterlings are helping Uncle Sam on the home front, and the entire Sterling factory is being utilized for essential war production...two good reasons why Sterling Wheelbarrows are practically unobtainable today.

After peace has been restored, Sterlings will again be available, in all styles and capacities, to help in the reconstruction work.



STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Sterling
WHEELBARROWS



Look for this Mark of
 STERLING Quality



(Continued from page 150)

without grease seals, is adequate. Personal experience has demonstrated to me that \$3,000 spent on installation of new crawlers with inclosed grease seals, purchased from the manufacturer of a popular tractor, is a profitable investment, eliminating breakdowns and other worries endured for the last 25 years. Some trenching machine manufacturers lately are offering these improved crawler tracks as standard or optional equipment.

Smooth-shoe tracks are best for a trenching machine because they allow slippage and provide cushioning effect when the digging buckets strike an obstruction. Grousers are good in wet or swampy ground, but they will do damage to the transmission and digging elements if left on when a machine is working on stable earth.

Money spent in inclosing chains, sprockets and gears in oil baths also has been a profitable investment for me. This kind of improvement probably will be offered more and more commonly by manufacturers of trenching machines in the future.

Design Improvements

Among the greatest improvements to come to my attention are the Fafnir self-oiling bearings with which two of my wheel-type trenching machines have been equipped for more than two years. Two of these bearings are placed on the high-speed engine drive shaft, and two more are placed on the final split-sprocket digging wheel drive of each machine. These bearings are subject to direct, heavy, sudden jolts and jars when the digging wheel strikes obstructions. Dirt, mud, water and sand pour over the bearings all day long. Never once have they given any trouble. As soon as they become available, I intend to put them on every bearing.

Trenching machines are equipped with either hydraulic or gear-driven boom hoists. The hydraulic type is quick-acting, but the geared hoist and cable arrangement gives more working range with the boom.

Much time is consumed when bucket teeth have to be changed, and a quicker method would be a great improvement. A medium-sized model of wheel trencher, for example, has 66 teeth with two bolts each, a total of 132 bolts. Putting on new teeth requires the handling of a total of 264 bolts, and a working day is shot in the process.

All new ditchers are equipped with arc conveyors, one of the best improvements made by the manufacturers in recent years. An arc conveyor, with a high-speed belt, can be used close to the ground and still throw spoil far enough away to

(Continued on page 156)

In Preformed, too...

IT'S "HERCULES" Red-Strand

Strength, endurance and ability to resist wear, tear and bending stresses are the fundamental qualities of every "HERCULES" (Red-Strand) Wire Rope. It has been serving the various industries for more than half a century.

For many purposes a Preformed wire rope

is the most efficient. If your work requires this type of rope, you will make no mistake if you let the **Red-Strand** be your buying guide. Preformed "HERCULES" is available in both Round Strand and Flattened Strand constructions. In this one grade you can obtain a correct type of rope for every heavy duty purpose.

Advantages of Preforming: It makes for easier, quicker and safer handling...it shortens "breaking in" time...it spools better on the drum...as the wires and strands are shaped to the normal form they will occupy in the rope, there is less turning and twisting of the rope in the grooves, and less internal movement of the wires and strands—all of which reduce both external and internal wear.

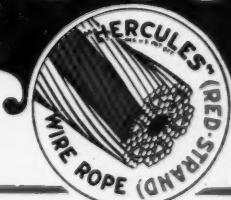


A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS

5909 KENNERLY AVENUE

NEW YORK ' ' 90 West Street
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DENVER ' ' 1554 Wazee Street



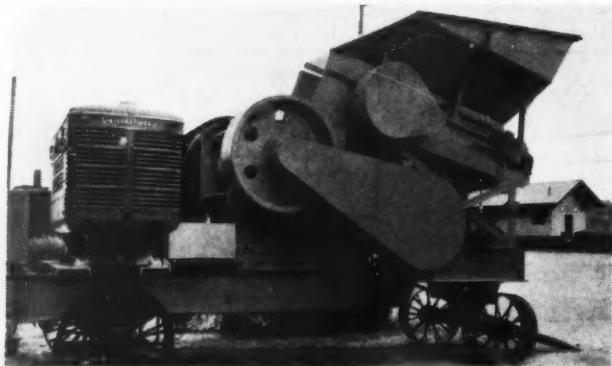
ESTABLISHED 1857

ST. LOUIS, MISSOURI, U.S.A.

SAN FRANCISCO ' ' 520 Fourth Street
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CRUSHING EQUIPMENT

FOR HIGHEST CRUSHING EFFICIENCY



Gruendler portable JAW CRUSHER and APRON FEEDER . . . a high capacity rock crushing unit—The choice of efficient operators



**Manufacturers of
PRIMARY HAMMERMILLS AND SECONDARY
HAMMERMILLS FOR LIMESTONE.**

Write for Illustrated Bulletins

GRUENDLER

CRUSHER and PULVERIZER CO. • ST. LOUIS 6, MISSOURI

Clipper MASONRY SAWS

A special shape or shorter length need only be as far away as your Clipper Masonry Saw. The basic feature of Clipper is the new multiple cutting principle . . . a method developed especially for Masonry Materials. You can be sure to cut with the fastest cutting speed and to obtain the longest blade life. Write for Catalog.

CLIPPER

MANUFACTURING CO.
4037 Manchester St. ST. LOUIS, MO.

(Continued from page 154)

assure operating efficiency of the machine.

Because of climatic changes, friction-type digging wheel safety slip clutches are practically never effective. In winter, they are too tight; in summer, they are too loose. A new arrangement is needed to assure functioning of friction-type safety slip clutches when a machine strikes an obstruction. Barber-Greene mechanical-type spring-loaded slip clutches come the nearest to being what is wanted on present-day trenchers. This arrangement could be improved to disengage the tracks simultaneously.

Future Work

Unlimited prospects face the trenching machine because of future developments in the following fields: (1) Underground installation of all utility lines is a must in the postwar program of every utility company; (2) draining of swamps and marshes will be continued to eliminate malaria and to make available fertile lands now lying dormant; (3) extension of natural-gas and city water lines into rural communities is needed to bring modern sanitary conditions to these localities; (4) irrigation of arid lands with river waters now going to waste is a definite postwar prospect.

None of these proposed large-scale ditching projects would be economically feasible without machines capable of digging a mile a day at a cost of only a few cents per linear foot.

Selecting an Operator

Skilled manpower will be abundant after the war, because men in the armed services have had extensive training in handling of machinery. My own experience on Army and Navy contracts has shown me that service men are intensely interested in machine operations and are willing to give time and effort to increase their knowledge of the machines. Several jobs are waiting in my organization for young men whom I have tried out, and these men can go to work as soon as they are released from the armed forces.

Selection of a capable operator is more important than the buying of the machine. Trenching machines are precision-built to do a specific job at high speed, and they just cannot take any abuse whatever. Unless a new man has had previous operating experience and has been well recommended, a contractor ought not to let him touch a trenching machine. One wrong move will bring irreparable damage. The automatic feature of trencher operation makes the machine extremely susceptible to damage hidden by obstructions. Constant alert-

(Continued on page 158)



Flash — On every competitive test to date, LaPlant-Choate's new 8-yard cable-operated scraper has "run rings around" all other competitive scrapers tested. A limited number are already in the field, with everything set for economical mass production as soon as military conditions permit. You'll agree — it's a scraper well worth waiting for!

THOUSANDS OF SATISFIED OWNERS AGREE

It's LPC for
LOWEST POSSIBLE COST



There are many good reasons why thousands of successful operators who have been using LaPlant-Choate rigs for years will keep right on buying them after the war. For one thing, these long-time users know from experience that LPC dozers and scrapers consistently move more yardage faster and at lower cost. They also know that LaPlant-Choate performance and dependability have been *job-proved around the world* under all types of conditions. And best of all, these veteran operators know that LaPlant-Choate will continue to lead the way in developing new improvements because LPC's entire organization is strictly "tractor-equipment-minded" . . . with more years of specialized "know-how" than any other company in the industry. So it all adds up to LPC — for lowest possible cost and better results — on your jobs, too. See your LPC-"Caterpillar" distributor today. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; San Leandro, California.

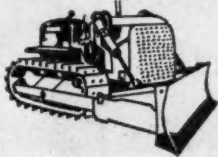


LAPLANT
EARTHMOVING AND LAND

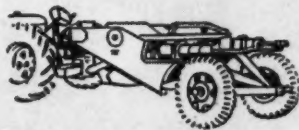


CHOATE
CLEARING EQUIPMENT

THERE IS A JOB-PROVED LAPLANT-CHOATE RIG FOR EVERY EARTHMOVING AND LAND CLEARING NEED



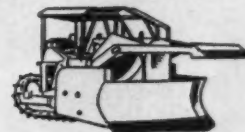
ALL TYPES OF DOZERS —
Straight or angling blade, hydraulic or cable operated, for every size of track-type tractor.



LARGE OR SMALL SCRAPERS —
Hydraulic or cable operated, front or rear dump, for use with your wheel or track-type tractors.



CABLE OPERATED RIPPERS —
For ripping up hard ground, shale or concrete to facilitate loading with LPC "Carrimer" Scrapers.



LAND CLEARING TOOLS — A complete line of Brush Cutters, Tree dozers, Rootcutters and Brush Rakes — all are interchangeable.



You complete jobs faster — with extra
savings in time and money — when you use a

LE ROI Portable Air Compressor

Le Roi compressors are the only ones in which both engine and compressor are built by the same manufacturer. You get the benefit of "matched" performance, integral design, and smooth-running teamwork. Extra mobility and easy maneuverability enables you to get to the job faster and into working position sooner. Because both engine and compressor are built to the precision standards of an engine builder, incorporating many quick-maintenance features, you have less "down" time and more operating time to save you money. The dependability of Le Roi Compressors, proved on thousands of jobs in war and peacetime, is your assurance of performance that keeps your schedules on time. Sizes range from .60 to 500 c.f.m.

Write for bulletins or see your Le Roi distributor.

Le Roi Company

Milwaukee 14, Wis.

1712 S. 68th St.

Distributors and Service Stations in Key Cities



C-63



(Continued from page 156)

ness and a watchful eye for hour-by-hour adjustment are needed to keep the machine operating at the highest state of efficiency.

An operator who says he can run anything, or who makes a bee-line for the starter button, is certainly not the man to hire. One who first looks the machine over carefully may be promising. If a likely man applies, it is best to start him off as a helper, in order to determine exactly whether he is adaptable to trenching machines, the nervous, high-strung racehorses of the construction field. Success in the trenching business comes from practically thinking and living with the machines.

Maintenance

Trenching machines can be maintained most successfully by an owner who operates his own machine shop. In all, three means are available for making machine repairs. Listed in order of their effectiveness and desirability they are: (1) Owner-operated machine shop; (2) parts bought from factory and installed in field; (3) commercial machine shop. As with other construction machines, constant, vigilant maintenance and regular lubrication and inspection pay dividends in steady output and fewer breakdowns.

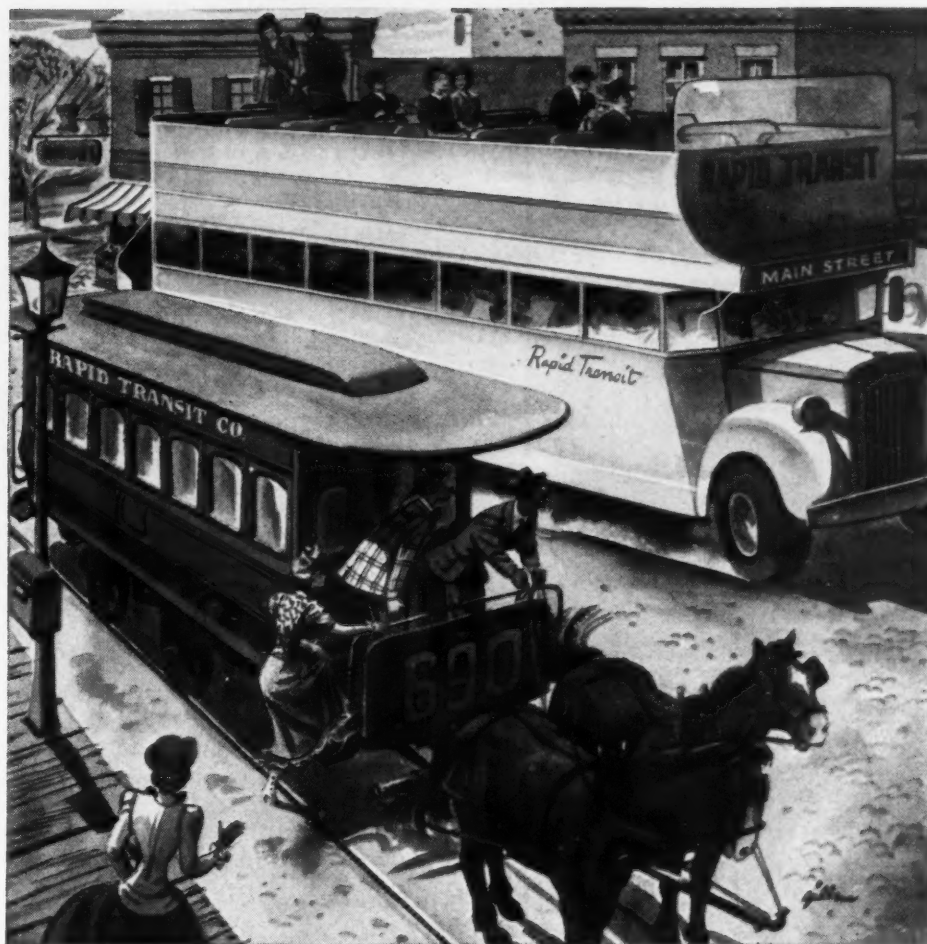
It will pay any owner or operator of a trenching machine to inspect the oil in the transmission case *right now*. Many a transmission has been ruined by the water which leaks down through the gear shift lever into the oil. If the oil has turned a dirty yellow, it should be drained out and replaced with fresh oil after the case has been flushed.

VOLUME OF TRENCH EXCAVATION

Cu. Yd. per 100 Lin. Ft.

Trench depth, in.	Trench width, in.						
	12	18	24	30	36	42	48
12	3.7	5.6	7.4	9.3	11.1	13.0	14.8
18	5.6	8.3	11.1	13.9	16.7	19.4	22.3
24	7.4	11.1	14.8	18.5	22.2	26.0	29.6
30	9.3	13.8	18.5	23.2	27.8	32.4	37.0
36	11.1	16.6	22.2	27.8	33.3	38.9	44.5
42	13.0	19.4	30.0	32.4	38.9	45.4	52.0
48	14.8	22.2	29.6	37.0	44.5	52.0	59.2
54	16.7	25.0	33.3	41.6	50.0	58.4	66.7
60	18.6	27.8	37.0	46.3	55.5	64.9	74.1
66		30.5	40.7	51.0	61.0	71.3	81.6
72		33.3	44.5	55.5	66.7	77.9	89.0
78		36.0	48.1	60.2	72.2	84.2	93.5
84		38.9	51.9	64.8	77.8	90.8	104.0
90		41.6	55.6	69.5	83.4	97.3	111.4
96		44.4	59.2	74.0	88.9	102.0	118.6

*There's
been a
big change*



★ Ever-increasing loads and heavier traffic have brought many essential improvements to transportation since the horse-car era . . . but only one outstanding change in tapered roller bearings.

That improvement came when Tyson developed the "all-rolls" design, with 30% more load-

carrying rollers around the raceway. The extra capacity, longer life and extreme rigidity have won for Tyson an enviable reputation among operators of heavy-duty equipment.

If yours is a "tough job," count on Tyson to take it.



TYSON BEARING CORPORATION, MASSILLON, OHIO

COUNT THE ROLLS • THE ROLLS COUNT

Tyson

THE LAST WORD IN ANTI-FRICTIONEERING



★ BUY WAR BONDS FOR KEEPS ★

READ THEIR STORY



"WER'E THE BIRDS WHAT KNOWS A WRENCH"

Believe us — there's plenty o' speedin' up on our joints with this new LOWELL socket wrench.

Why not?—No Liftin'—Just a steady Pumping and we're ready for the next nut.

Put your beef on the butt end of one of those tools boy—and any joint's gotta be tight.

You c'n take it from us these LOWELLS are strong, too, and they wear—that's why the boss got 'em. You can always tell 'em easy by the red socket and black handle.

Send for Catalog

LOWELL

THE "OLD RELIABLE"

LOWELL WRENCH CO.
Worcester Mass.

Pennsylvania

Stabilization Test

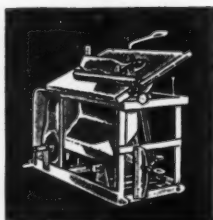
(Continued from page 73)

Pennsylvania Highway Department wished to test its effectiveness on a state road. Designed to test stability and resistance to water penetration only, the experimental project is located on a light-traffic rural road, carrying less than 50 vehicles per day, where the cost of a wearing surface cannot be justified. On routes carrying more than very light traffic, a surface course is recommended to protect the waterproofed soil.

On a 3,142-ft. (0.6 mi.) graded road 22 ft. wide, Stabinol was mixed in to 14-ft. width and 6-in. depth at a rate of 6 lb. per sq.yd., or 1 lb. per in. of depth, roughly equivalent to the addition of 1 percent of the waterproofing agent. Depending upon the characteristics of the soil on a project, the quantity of Stabinol required to provide adequate waterproofing may vary from ½ to 2 percent or more. The

(Continued on page 164)

C.H.&E.

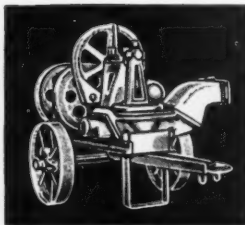


SAW RIGS

4 sizes—ripping capacity 2" to 6" lumber — gasoline engine or motor drive.

PUMPS

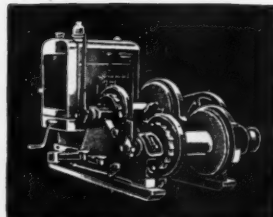
Diaphragm,
Self-Priming
Centrifugal
Piston
Triplex &
Jetting
Pumps



Also
3-Ton
Road
Roller

HOISTS

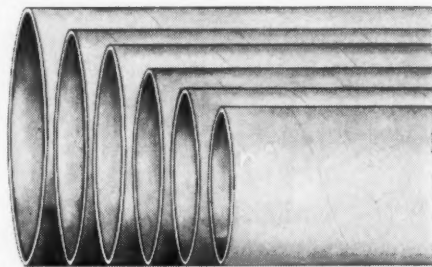
5 sizes — from 800# to 7000# lifting capacity — gasoline engine or motor drive.



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6 Standard Sizes

Up to Twenty-Four Feet Long

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SQUARE INCHES					
50.26	64	78.54	100	113.1	144

Smaller sizes available.

SAVES TIME

Cut to lengths on
the job. Minimum
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For One Time Use Only
IMMEDIATE DELIVERY

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Clear Land at Lower Cost —Increase Tractor Income!

PACIFIC NORTHWEST land clearing costs have actually been cut from 50 to 75 per cent by Isaacson Klearing Blades. This may seem like an over statement, but the fact remains they are doing it for others and will do it for you.

First developed as a means of making logged-off stump land usable, these blades have since been adopted by many users for removing quickly and easily, trees, brush, stumps, roots and rock. These users particularly admire the way they comb out roots and other obstructions to a depth of 21 inches below the ground top, leaving the valuable top soil intact, ready for plowing. They like, too, the manner in which the blade piles the material, dirt free, ready for burning.

The specially designed teeth, adjustable to three positions, are shaped for maximum penetration and lifting power. The blade fits into the positions of your regular blade in a few minutes.

Available now for your Isaacson cable or hydraulic operated Trac-Dozer. See your dealer today, or write for complete details —prove to yourself you can cut YOUR clearing costs.

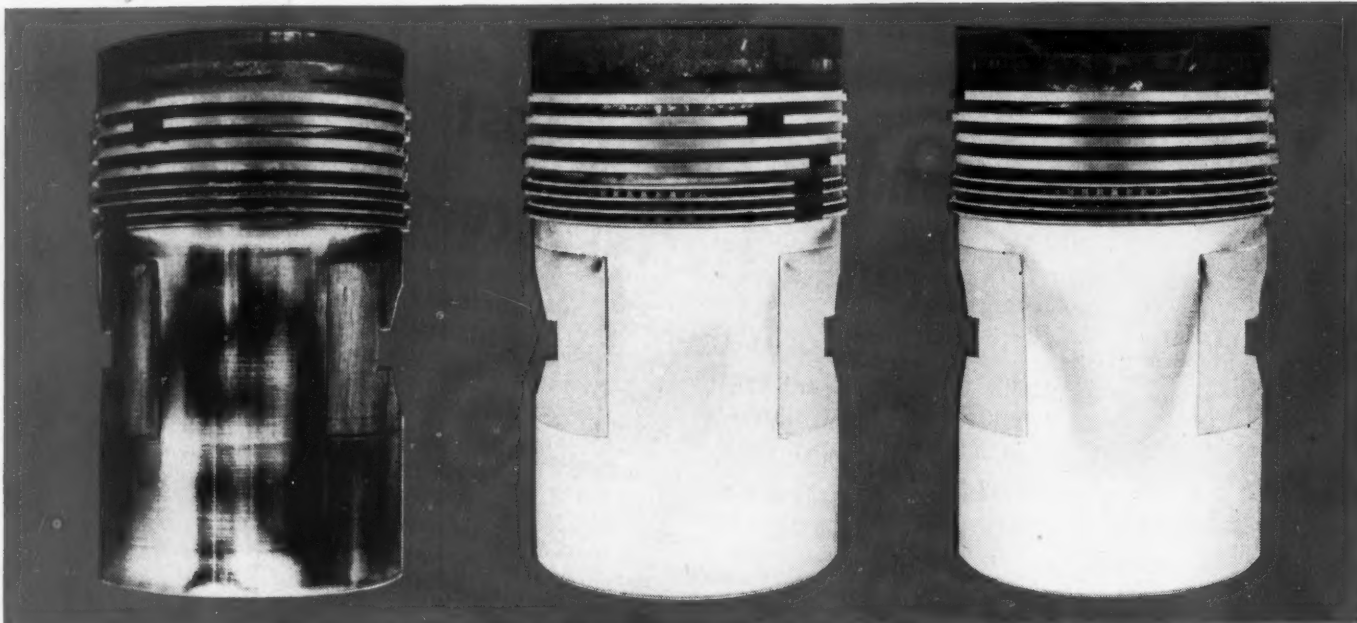


ISAACSON

Tractor Equipment

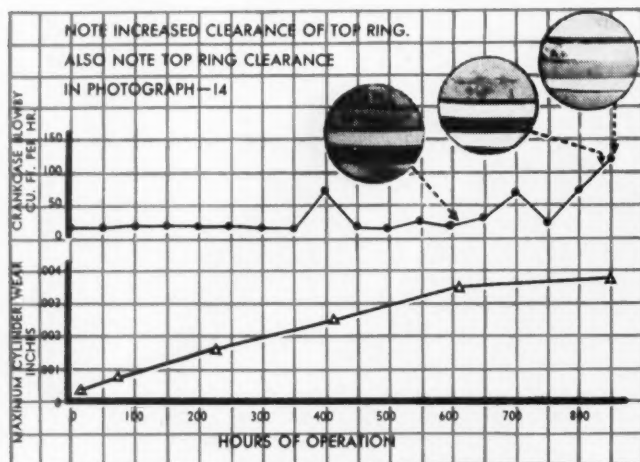
A PRODUCT OF THE ISAACSON IRON WORKS • SEATTLE

How RPM DELO OIL prevents ring sticking

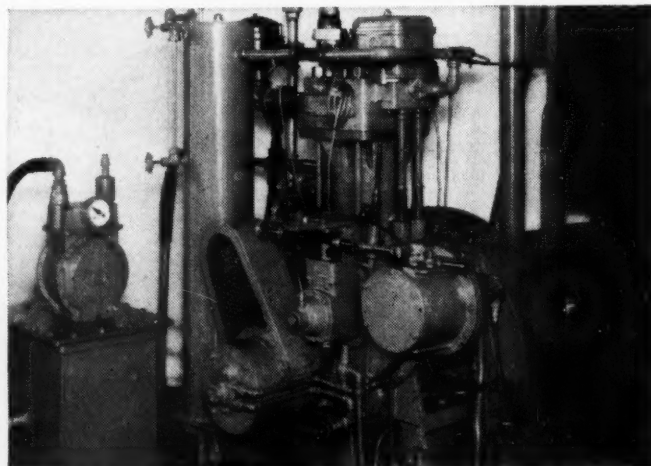


Even the finest un compounded mineral oil will leave deposits on rings and skirts when operated under severe engine conditions. The above photo shows a test engine piston after 264 hours operation with the finest obtainable un compounded Diesel engine oil.

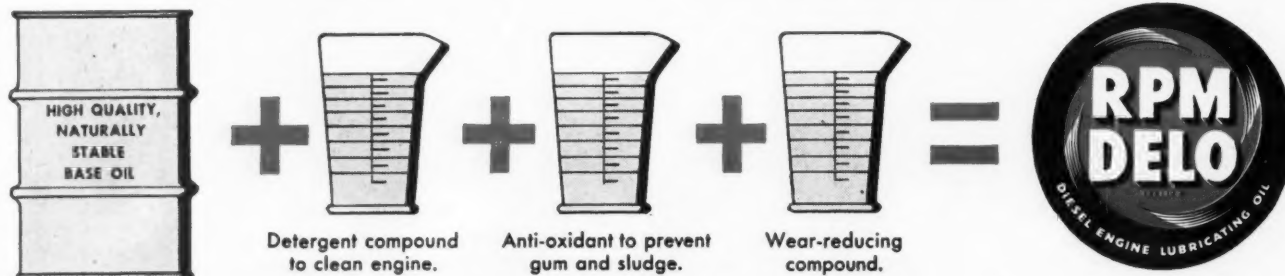
Here's the same test made with RPM DELO Oil, only this time for 1000 hours—more than double the 480-hour test required in current military specifications. The photographs above show both thrust and anti-thrust sides of a piston after a 1000-hour test with RPM DELO Diesel Engine Lubricating Oil. Note that RPM DELO Oil has almost entirely prevented any deposits on skirts. Dark areas around rings are only soft carbon, not sticky varnish. The compounding in RPM DELO Oil makes this possible by preventing the initial formation of sticky varnish.



How blowby caused by cylinder and ring groove wear increases rapidly is shown by the above chart. Excessive side clearance caused by ring groove wear allows the ring to rock in its groove and "bite" into cylinder walls. RPM DELO Oil checks this wear at the start by an adhering agent which makes it cling to hot cylinder walls.



This single cylinder laboratory engine is used to measure the ring-sticking characteristics of Diesel lubricants. The test record of RPM DELO Oil has been confirmed by sales of millions of gallons since its development. For more technical information on RPM DELO Oil, write for Booklet T-7, Standard of California, San Francisco 20, California.



STANDARD OF CALIFORNIA

RPM DELO Oil has world-wide distribution under the names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Imperial RPM DELO, (CONCENTRATE)

Wire rope performance is a big factor in determining project profits

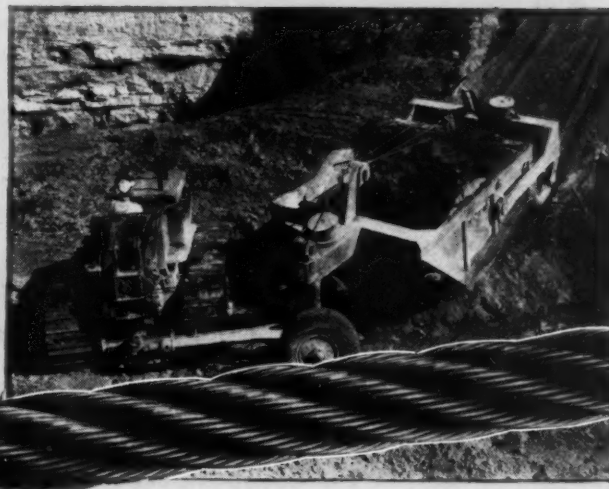
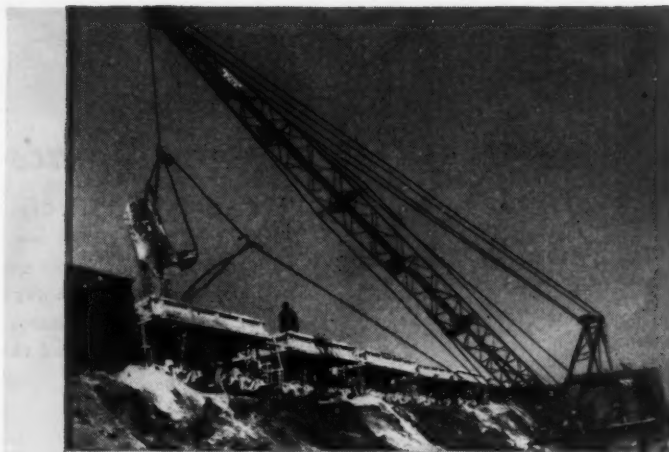
THAT'S why it is important to consider the service you can expect from your hauling, hoisting and dragline cables before you begin another job.

By rigging with U.S.S. American TIGER BRAND Excellay Preformed Wire Rope you increase the efficiency of your men and equipment, reduce lay-up time and speed the job's completion.

Strong, tough and flexible, TIGER BRAND is built to resist bending fatigue and early wear when operated at fast speeds over small sheaves and drums. It is safer to work with because broken wires lie flat and in place instead of "porcupining."

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UNITED STATES STEEL

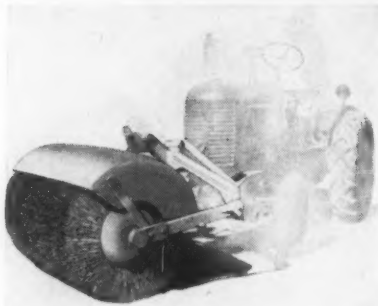


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*Wire
Rope*

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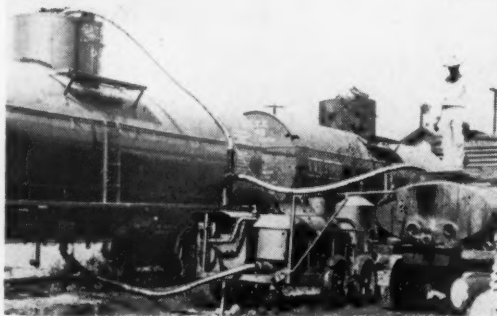


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... Grace Sweepers with extra long-life bristles are available now... without priorities. Easily and correctly adjustable, Grace motor or 2-way axle-driven sweepers sweep a path 55 inches wide EXTRA clean... spreads evenly and thoroughly. Fast... economical.

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pound



WISCONSIN MOTOR
Corporation

MILWAUKEE 14, WISCONSIN, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

(Continued from page 160)

average quantity required is about 1 percent of the dry weight of the soil. An excess causes no harm, but a deficiency nullifies the effect.

To prepare the tightly compacted shale soil road for treatment, an Austin 10-ton three-wheel roller ripped the material 6 in. deep with an hydraulically controlled seven-tooth scarifier. For greater traction, studs were used on the rear drive wheels of the roller. The road consisted of local red shale of good quality; most of the shale was of a kind that disintegrated upon weathering, but some of it was hard and weather-resistant. Over-size chunks of the latter kind were removed from the road with hand shovels during the scarifying and mixing processes.

Admixture Drilled Into Soil

Mechanical application of the pulverized waterproofing agent was possible on this job, where a lime spreader could be readily obtained in the local farming community. Distribution by truck-drawn spreader was preferable to the ordinary method of dumping the material across the treated width by hand from sacks previously spotted at proper intervals on the shoulder. Stabinol was shipped by rail to Gettysburg, 9 mi. from the job, in 75-lb. sacks of waterproof multipleply paper, 50 percent larger than the 50-lb. sack which will be the standard size later. A truck-and-trailer hauled to the job on one trip the 15 tons (29,325 lb.) of Stabinol required for the 4,900 sq.yd of treatment. Pulling the lime spreader, which was kept filled with material from the bags by men riding the trailer, the truck-trailer unit was able to cover the 14-ft. treated width on each round trip.

Because the spreader, which functioned in the same manner as an agricultural drill, could distribute Stabinol only at a limited rate, five round trips were necessary to apply the 15 tons. Behind the spreader, the 10-ton roller scarified the compacted tracks left by the loaded truck-trailer, and the disk harrow mixed the waterproofing powder into the soil. Mixing with the tractor-harrow, a Ford Ferguson unit, continued for a total of about 10 hr. During all operations, an Adams gasoline-powered 10-ft. patrol grader kept the road in shape.

When the work started, the moisture content of the shale soil appeared to be near optimum, but during the scarifying, spreading and dry mixing, evaporation caused a moisture loss, despite one brief shower. Following the dry mixing, additional water was applied by gravity spray from a truck-hauled tank wagon. The disk harrow followed the wagon to turn

(Continued on page 166)

BRIXMENT MORTAR

Is More Plastic



To compare the plasticity of any two mortars, try shoving a brick into place, with a full head



joint. The more plastic the mortar, the easier the work. Try this with Brixment mortar!

AND GOOD PLASTICITY

IS THE FIRST REQUIREMENT OF GOOD MORTAR

One of the most important characteristics any mortar can possess is *plasticity*. Within certain limits, plasticity is the greatest single factor not only in the *economy* of the brickwork, but also in its strength, its neatness, and its resistance to the passage of water.

One of the outstanding characteristics of Brixment mortar is its unusual plasticity. For twenty-five years, brick-

layers all over the United States have agreed that the workability of Brixment is comparable to that of straight lime putty. This exceptional plasticity makes it easy for the bricklayer to secure neat, economical brickwork, with the brick properly bedded, and the joints well filled. And because of this unusual plasticity, a bag of Brixment will carry three full cubic feet of sand and still make an ideally workable mortar.

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AGRICULTURAL HANDLES

AMES BALDWIN WYOMING CO.
PARKERSBURG, W. VA. NORTH EASTON, MASS.

(Continued from page 164)

the moisture under and mix it with the treated soil. Consolidation already had begun in the lower portion of the treated soil, but the added water aided compaction and bonding of the top 2½ or 3 in. at about optimum.

During these latter stages, the motor grader built up the cross-section profile to a medium roof crown for final compaction by the 10-ton roller, operating without wheel studs.

Photographs illustrate several steps in the construction process and indicate, in some measure, the waterproofing effect of the soil admixture.

Job Costs

Stabinol was furnished to the Pennsylvania experimental job at a current car-load price of 4½c. a pound. At 6 lb. per sq.yd., the cost of the waterproofing agent was 27c. Total cost of the improvement on this initial experiment was 44½c. per sq.yd. as shown by an accompanying table. Pennsylvania maintenance engineers believe that, with experience, the manipulation cost probably could be reduced.

Direction

Maintenance forces of the Pennsylvania Department of Highways for Adams County built the Stabinol test project under the direction of L. D. Lambert, district maintenance engineer for District 8, with the following men in charge in the county and on the job: W. J. Kendlehart, county maintenance superintendent; Allen Sharrah and Robert A. Thompson, assistant maintenance superintendents; and Luther O. Beitler, foreman.

At the head of the department, John U. Shroyer is secretary of highways and a member of the governor's cabinet, John L. Herber is chief engineer, and Warren K. Myers is chief maintenance engineer. For the Hercules Powder Co., Evert Mayfield, P. J. Reno and S. C. Wendell, engineers, gave personal attention to the experimental project.

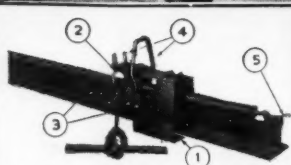
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COST OF PENNSYLVANIA TEST JOB

3,142 Lin. Ft.—0.60 Mile
14 Ft. Wide—4,888 Sq. Yd.

GRADING (widening, removing vertical and sloping banks).....	\$364.52
SURFACE: Scarifying & shaping surface.....	\$107.25
Hauling extra material for surface.....	62.28
Pulverizing (disk and two men—4 hr.).....	12.00
Placing of Stabinol*.....	277.92
Cost of Stabinol.....	1,320.75
1,780.20	
OPERATION CHARGE.....	30.57
TOTAL.....	\$2,175.29
COST PER SQ. YD.....	\$0.445

*Includes mixing, sprinkling, and rolling.

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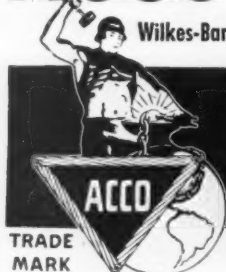
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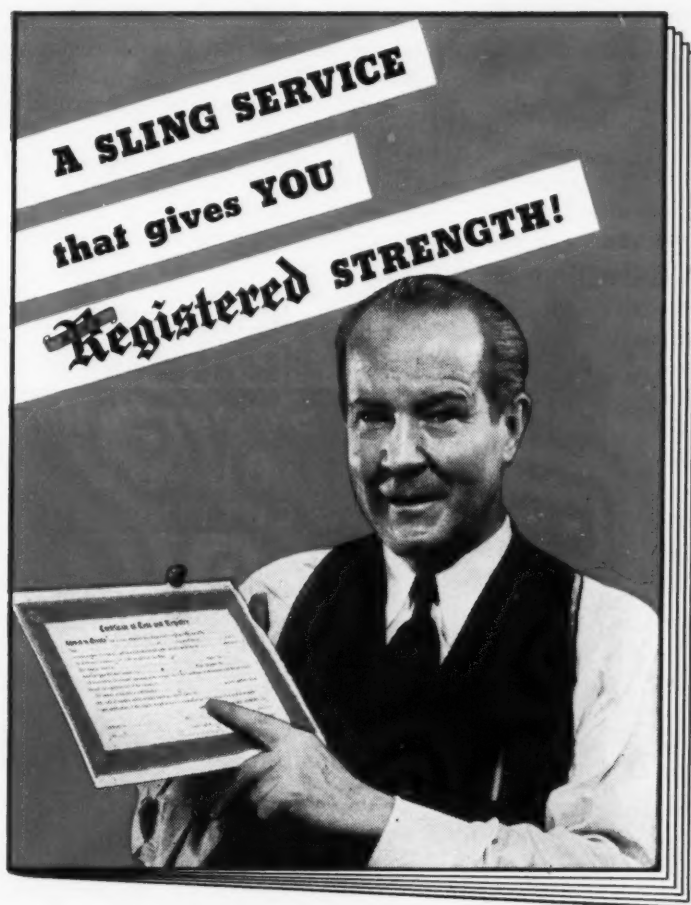
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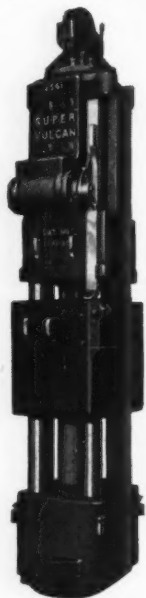


Send for this Bulletin
which gives you
7 reasons why
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OPEN TYPE
DIFFERENTIAL-ACTING
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meet all needs

VULCAN IRON WORKS
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Chicago 12 --- Illinois

Fast Work From Two Ends

(Continued from page 102)

hr. was available between tides for building forms, cleaning out and placing concrete in this lift, the size of base sections had to be limited to about 60 cu.yd. It was useless to attempt to unwater the excavated trench by pumping, and concrete for the base lift was deposited by the tremie method to displace the water and any soft muck remaining between the forms.

Each succeeding lift enjoyed a somewhat longer time interval for construction between tides. For the second lift, the interval was about 4½ hr., and for the top lift, 6 to 8 hr. On windy days, construction was impossible. As the muck on rock provided no dependable anchor for bracing the forms from the outside, the form panels had to be secured in place by internal ties to resist the pressure of the concrete.

Concrete was designed originally with six sacks of cement per cu.yd. for a com-

(Continued on page 172)

How to make sound, accurate building construction ESTIMATES

A
complete
how-to-do
course
on the
estimator's
job



HERE is a practical new book dealing specifically with the specialized job of the building construction estimator. This book gives a clear picture of contracting as a business, and presents all the material the estimator needs on materials, methods, building codes, specifications and contracts. Covers in full detail the everyday work of the estimator in drawing up complete, accurate, workable estimates on every phase of building construction.

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By George H. Cooper

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282 pages, 5¼ x 8¼, 161 illus., \$3.00

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Outlines the many administrative and technical skills involved in constructing a building, showing the relationship between the contractor, architect and the owner, and giving specific details on plans, specifications, contracts and estimating costs.

Gives you helpful tips on

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for you a special steel,
milled through our own
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edges to give that extra
wearing quality you need.

All widths lengths, and
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Consult your internation-
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operate—get set for Blades
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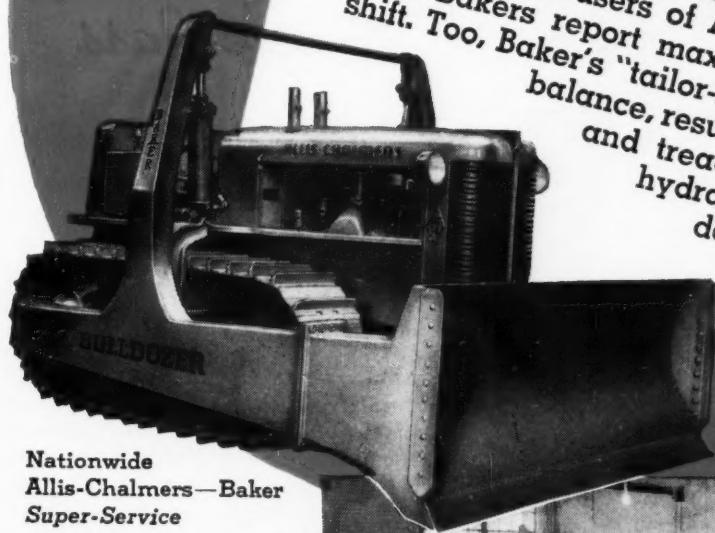
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THEY WORK WELL TOGETHER**

They Go Together!

Certain things go together like salt and pepper, balls and bats, peaches and cream. Baker Bulldozers or Grade-builders and Allis-Chalmers Tractors are in this category — they go together! Bakers look trim on A-C tractors; neither clumsy nor top-heavy. They fit like a glove — just as though they were designed and built by one company under one roof.

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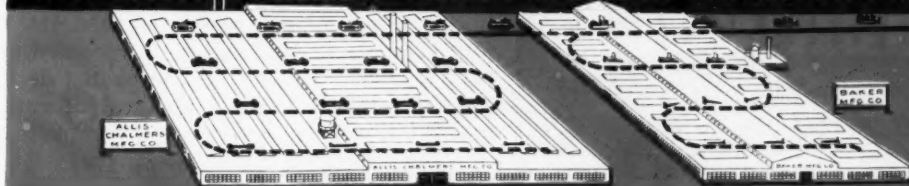


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Concrete with calcium chloride works easier and finishes better, leaving less voids and fewer defects for later pointing up.

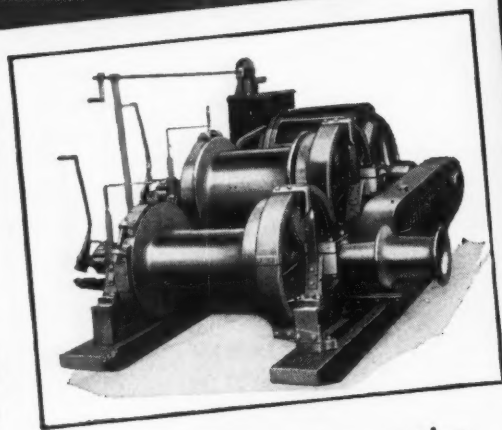
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MAIN OFFICE AND WORKS • ELIZABETH, NEW JERSEY

(Continued from page 170)

pressive strength of 4,000 psi. at 28 days, but soon after work started the proportion of aggregate was adjusted upward by 15 percent to take advantage of the plasticity afforded by the admixture, according to Robert L. Mauchel, vice-president, Master Builders Co., who served in a consulting capacity. Tests of the concrete throughout the job showed early compressive strength of 3,500 psi. at 7 days, as reported by Francisco Morales, Jr., project engineer for his father's firm, who also stated that the admixture contributed to successful pumping of the concrete by keeping the fine sand from segregating and clogging the pipeline.

Pumped concrete was delivered by a Pumpcrete machine which could send about 60 cu.yd. per hr. through a pipe line from a plant containing two mixers at one end of the seawall. For the other end of the job, the contractor was unable to obtain anything larger than a ½-yd. mixer. This mixer was set on a platform to discharge concrete into a dump truck which hauled three batches totaling 1.725 cu.yd. per trip.

★ ★ ★

Single-Pass Stabilizer

(Continued from page 100)

ing, spraying and mixing), the machine leaves in its wake a mixture of uniform gradation and moisture content. Where an admixture, either liquid or powdered, is incorporated in the mix, the single-pass processing machine distributes the added material uniformly throughout the mass. Any dry, pulverized admixture is blended with the soil before the stabilizer adds moisture and performs the final mixing. The fluffed mixture is struck off by the tailboard of the stabilizer at the proper level to allow for compaction.

Processing Results

Equipped with a powerful diesel engine, the stabilizer processes a strip 8 ft. wide at various selective speeds from 10 to 35 ft. per min., depending upon the condition of the material and the depth of processing. A friable soil can be processed without previous scarifying. On its two Texas jobs, the stabilizer processed materials for 6- and 8-in. compacted depths. The operator has full control of raising and lowering the processing compartment

(Continued on page 174)



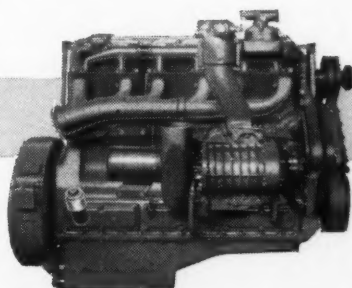
Of this... ***SURE*** YOU CAN BE

SURPLUS POWER IS PROTECTION . . . protection against the damaging shocks, jerks and strains that add to the abuse and shorten the life of powered earth moving and material handling equipment when there is barely "enough power" for *normal* requirements. *Surplus power* is protection, too, against lagging work cycles or accidents because reserve power is always available for peak loads or to meet any emergency.

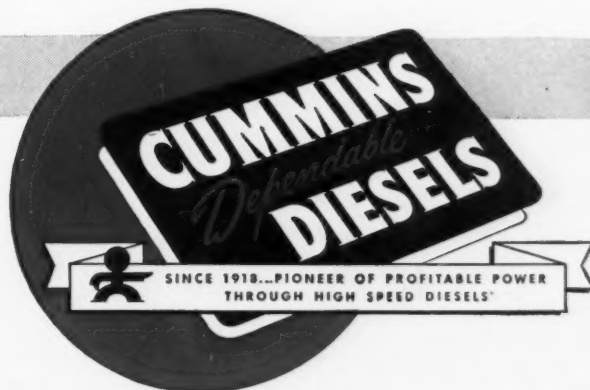
For your wheel or crawler-mounted equipment or stationary applications, you can be sure of *surplus power* at the minimum cost in space and weight by

standardizing on Cummins Dependable Diesels. Three compact, low-weight-per-horsepower models—150, 200 and 275 hp.—have almost the same mounting dimensions and may be used interchangeably in many cases. All have the same basic design and incorporate a large percentage of the same parts. This assures a simplified service procedure and reduces the parts inventory . . . important points in holding down costs and increasing profits.

Have you carefully considered these advantages in specifying Cummins Diesels for your equipment?



Illustrated is the supercharged, 275 hp. Model NHS Cummins Diesel. In design, dimensions and weight it closely approaches the 150 hp. Model H and the 200 hp. Model NH. All are designed for automotive, portable and stationary power applications. Ask for specifications.



CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Reliance

**NOW
Ready
To Serve You**



Reliance Products

Rock Crushers, Bucket Elevators, Revolving Screens, Storage Bins, Pulverizers, Chip Spreaders, Heating Kettles, Bin Gates, Feeders, Belt Conveyors, Grizzlies, Air Separators, Sand and Gravel Spreaders, Wash Boxes.

NOW—you may profit by our vast experience providing the Armed Forces with rugged equipment for Crushing, Screening and Conveying concrete aggregates, and other machinery for ROAD BUILDING.

Some RELIANCE equipment will soon be available. Write us your requirements today.

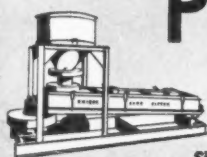
UNIVERSAL ROAD MACHINERY CO.

Kingston, N. Y., U. S. A.

DISTRIBUTORS IN ALL PRINCIPAL CITIES OF U. S. A.

Materials

PROCESSING EQUIPMENT



Sifters, Crushers, Cutters, Dry and Liquid Mixers, Mills, Grinders, Pulverizers, Conveyor Systems, Complete Installations.

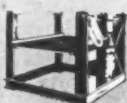
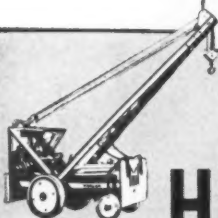


The handling equipment construction "know-how" of the Mercer Engineering Works, Inc., Clifton, N. J. . . . The more than 40 years processing equipment experience of Robinson Mfg. Co., Muncy, Pa. . . . All are embodied in and represented by

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Materials

HANDLING EQUIPMENT



Trailer Trucks (All Types) Wheel Tractor Cranes (3 to 7 ton) Fork Lift Trucks, Lift Platforms, Hoists, Live Skids, Wheels, Casters.

(Continued from page 172)

of the machine; the processing elements always ride at grade to assure full-depth action by every part.

Two individually controlled spray bars are built into the machine to apply liquids to the soil particles as the particles are cast into the air after blending to uniform gradation. Control of any combination of nozzles on the two-spray bars provides full flexibility in the application of water or liquid binders.

Compaction of the thoroughly fluffed and loosened mixture left by the machine can begin immediately except on projects where time must be allowed for evaporation of volatile solvents from bituminous cutbacks. Tamping feet of sheepsfoot rollers are able to get full-depth compaction in the fluffed material.

H. C. Hettelsater, manager of the stabilizer division, has been in charge of the development of the single-pass stabilizer for the Harnischfeger Corp., Milwaukee, Wis.

★ ★ ★

Continuous, Flexible Pipelines

(Continued from page 70)

Conundrums (or "Conuns" for short) were moored in deep water at the end of the pipe-racks, so that 4,000-ft. lengths might be welded into a continuous length of 30 mi. or more and wound on to the Conuns as shown in an accompanying illustration. A Conun is 90 ft. long, more than 50 ft. in diameter overall, and when fully wound weighs 1,600 tons—the weight of a destroyer. It can carry 70 mi. of pipeline. The drum around which the pipe is wound is 40 ft. in diameter and 60 ft. long.

Pipe-Laying Flotilla

After the successful trials of the HAIS cable in April, 1943, Geoffrey Lloyd arranged that the manufacture of HAIS cable and Hamel pipe, and the coordination of the whole scheme, together with provision of pumping stations on the English shore, should be the responsibility of Britain's Petroleum Warfare Department. The work then developed in conjunction with the Admiralty Department of Miscellaneous Weapons Development, while the Royal Navy ac-

(Continued on page 176)

Q Are you preparing today for tomorrow's competition?



A If you're not—you should be! Make sure now that your machines will have less "down time," cost less to maintain, yet produce more work. For example: one contractor cut track roller and other bearing failure 25%—saved up to 20% on lubricants by switching to Alemite "on the job" power lubrication. "Down time" saved became extra productive time. An Alemite Portable Service Station can help you meet tomorrow's tougher competition!

**More Productive Time*

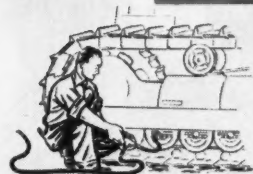


Q Is "on the job" lubrication costly?

A On the contrary—an Alemite Portable Service Station pays for itself by saving money! Take the case of the contractor who was losing money on 5 machines because of slow lubrication methods. A Portable Service Station brought power lubrication to the machines... cut lubricating time 50%... gave him an hour and forty minutes "M.P.T."* per day! The savings in maintenance, machines and time soon paid for the new method. Checked your lubrication time lately?



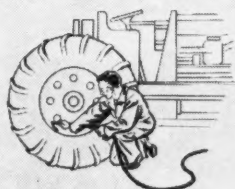
LOOK HOW VERSATILE!



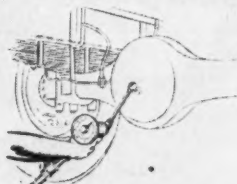
Fast, easy lubrication of track rolls and all bearings having pressure gun fittings.



No time or oil wasted in filling crank cases, or other oil containers, with the amounts desired.



Air line equipment for tire inflation, air jet cleanings, engine cleaning, paint spraying, etc.



Quick and precise dispensing of gear lubricants to gear housings, transmissions, final drives, etc.

Save Time, Money and Machines with an Alemite Portable Station!

1. It saves time by bringing positive power lubrication to your machines. They need not leave the job.
2. It saves money by cutting "down time"... increasing productive time.
3. It saves machines... makes them last longer... by reducing bearing failure due to faulty lubrication.

Alemite Portable Service Stations come complete with high and low pressure barrel pumps, oil dispenser, hose reels and gas engine air compressor. The time, money and machines you save can be of tremendous help in showing additional profit on contracts.

FREE: Illustrated catalog describing Alemite Portable Service Stations. Also, complete Catalog of individual Alemite lubricating equipment. Send coupon for your copies.



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LUBRICANTS • MAINTENANCE

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YOU and this *New* JOHNSON TWIN Silo Cement Plant



for a profitable partnership

 This new plant has the greatest capacity of all Johnson portable plants (up to 1600 bbls). Provides fast and economical handling of bulk cement on paving jobs. Silos are water tight and require no field bolting. Constructed in all-welded units, it can be set up quickly *without a crane*. The entire leg and silo assembly tip into position on pivoted base with gin pole and tractor winch.

PORTABLE SECTION BINS

If you need less cement storage capacity this portable equipment deserves careful consideration: 280, 390 and 500 barrel capacity. Johnson Portable Section Bins are designed for unloading and batching cement delivered by any type of transportation.

JOHNSON DUTCH MILL

Constructed in 3 or 4 sections for easy, fast set-ups and dismantling. No pit required for elevator. Easily converted into cement transfer plant. 50, 100 and 150 barrel capacity. *Can be equipped with 2 cement batchers.*

ELEVATING CHARGER

Where no storage is required the Johnson Elevating Charger will batch cement directly from hopper bottom or boxcars.

Whatever your needs—from a small charger to the largest central mix plant—there is Johnson equipment to fit your requirements. Write today.

a Koehring Subsidiary

**The C. S. Johnson
Company**
Champaign, Illinois

(Continued from page 174)

cepted the responsibility of laying the pipes at sea. To carry out the pipe-laying operation, "Force Pluto" was formed under Capt. J. F. Hutchings of the Royal Navy, composed of ships of all sizes from 10,000 tonners down to barges and motor-boats. The force was placed under the command of Adm. Sir Bertram Ramsey, Allied Naval Commander.

Force Pluto's main base was Southampton, England, with a secondary base at Tilbury. The force numbered 100 British Merchant Navy officers and 1,000 men. In addition to H.M.S. *Holdfast*, three merchantmen were fitted with the cable-laying machinery. Two could carry 100 mi., and one, 30 mi. of HAIS cable. Thames barges were converted for handling the cable at the shore ends, where large ships could not operate. Six Conuns handled the Hamel pipe. New pipelines were run from the British fuel storage system to carry gasoline to the coast, and special high-pressure pumping stations were cleverly camouflaged. One of these was in a row of blitzed houses at Sandown, on the Isle of Wight; another was in an old fort built in the 1860's against possible invasion by Napoleon III; and others were in a modern amusement park and in seaside villas at Dungeness.

Quick Channel Crossing

Operation Pluto began as soon as the mines had been swept from the approaches to the tip of Cherbourg Peninsula. The lines running from the Isle of Wight to Cherbourg took 10 hr. to lay and when put in operation conveyed gasoline to the United States armies. The lines established as soon as Boulogne was captured, from Dungeness to Boulogne, took 5 hr. to lay and supplied gasoline to the British 21st Army Group. Frequently, in rough weather, men of the Royal Army Service Corps had to wade up to their necks to bring in the ends of the lines from the ships. An R.A.S.C. petroleum unit maintained direct contact from England with the French terminals by cross-channel wireless telephone, thereby enabling instant reporting of variations in the quantities delivered.

Paying tribute to this engineering feat, Prime Minister Churchill said: "A large part of the Allied Expeditionary Force has been supplied with petrol by this unique method, which provides for petroleum the same kind of facilities upon a hostile shore that the Mulberry (pre-fabricated) harbors provided for general military stores."

General Dwight D. Eisenhower expressed his "... warm appreciation of the work the Pluto pipelines have done in supplying United States as well as British forces in their drive into Germany."

*You Can "Raise"
and Win
on these 3 Jacks!*

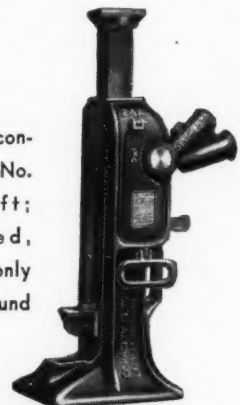
10 TONNER

the ideal jack for most contractors. No. 22, 12½" lift; height closed, 21¼". Toe lift only 2¼" from ground level.



15 TONNER

for heavier construction work. No. 24A, 13" lift; height closed, 23¼". Toe lift only 2½" from ground level.



20 TONNER

the jack for building moving, bridge work and heavy engineering projects. No. 2029, 18" lift; height closed, 28¼". Toe lift only 2½" from ground level.



Templeton, Kenly & Co.
Chicago (44) Ill.

Simplex
LEVER · SCREW · HYDRAULIC
Jacks

For Complete Facts

send for this folder



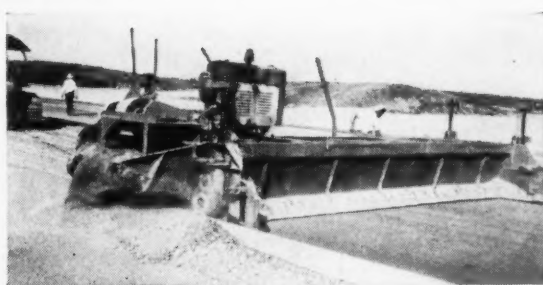
The many unique features embodied in the new Standard-Lewis Subgrader come as a result of design by practical paving equipment engineers. These men know well the problems encountered and have built into this machine many practical improvements that save contractors, time, labor and money.

The new Standard Steel 8-page folder covers in detail all information relating to the efficient operation and economy provided by this ingenious Subgrader.

A request on your letterhead will bring a copy promptly.



This is an example of deep cutting into tough material—gravel as large as 14" in diameter is handled with ease.



No chipped or broken edges of concrete pavement is experienced with the solid rubber tired wheels you can use on the STANDARD-LEWIS Subgrader.

OTHER **STANDARD** PRODUCTS

ASPHALT AND CONCRETE FINISHERS

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R-F-B (Raybestos Friction Blocks). Dense combination asbestos, brass particles binding material and proper friction controlling ingredients; molded or machined to exact shape required.

Raybestos leads with the most complete line of friction materials for road builders, shipyards, contractors, and in farming, mining, lumbering and coal stripping operations.

THE RAYBESTOS DIVISION of Raybestos-Manhattan, Inc., BRIDGEPORT, CONN.

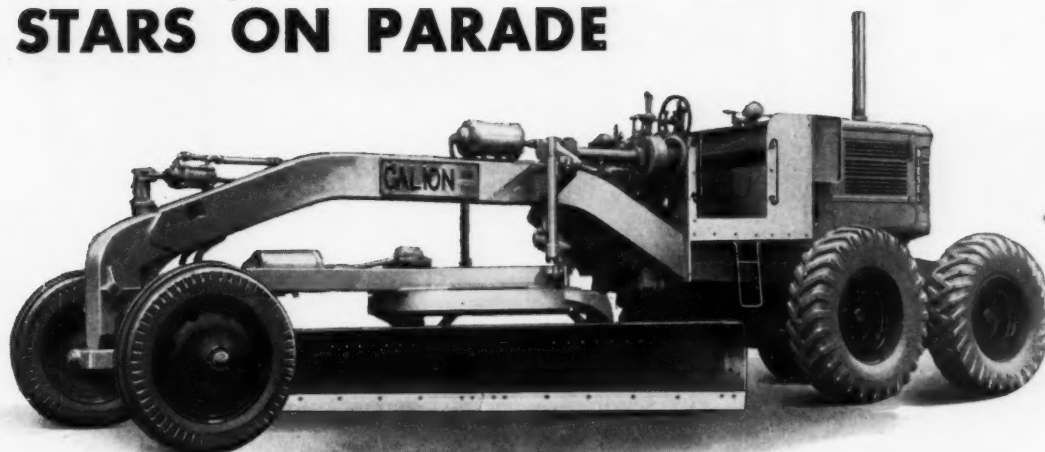


BUY AN EXTRA BOND



MANUFACTURER of FULL METALLIC, SEMI-METALLIC, WOVEN and MOLDED FRICTION MATERIALS.

STARS ON PARADE



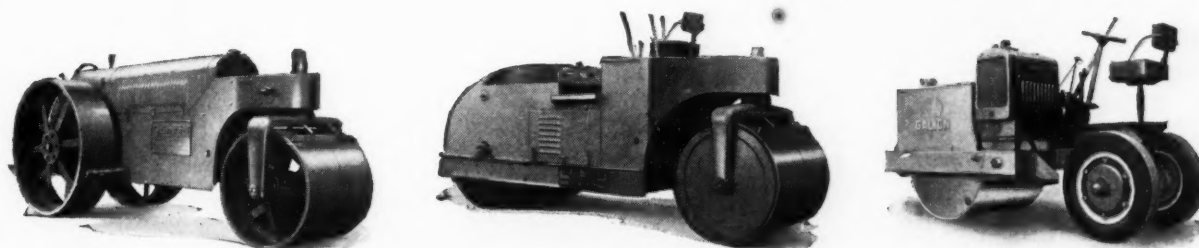
Motor graders that not only "Know How" but go ahead and do that job in road and airport construction to your complete satisfaction. Many features which will assure you "More Miles Per Galion".

Well, now . . . there is little we can say that you do not already know about Galion road machinery. We're still at it—we're keeping up to date—we're trying to supply as many of these modern units as possible—we're proud of our war record—we're hoping that you will remember Galion when you next want equipment that will give you STAR performance day after day.

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ROLLERS FOR PRECISE COMPACTION

A type and size—3-wheel, tandem and portable—to provide precise compaction on many exacting jobs in road and airport construction. Stars every one of them, they will not let you down.

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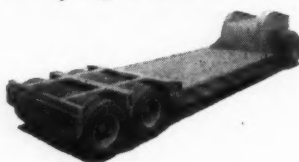
Ease of tire changing



A VALUABLE ROGERS LOW-BED TRAILERS FEATURE

FORMERLY tire changing required jacking up the trailer and in some cases the removal of the whole axle unit. A big job in any event that was especially difficult if a tire went out while carrying a load.

With Rogers Trailer this job is comparatively easy, as it is possible to remove any tire without disturbing other casings.



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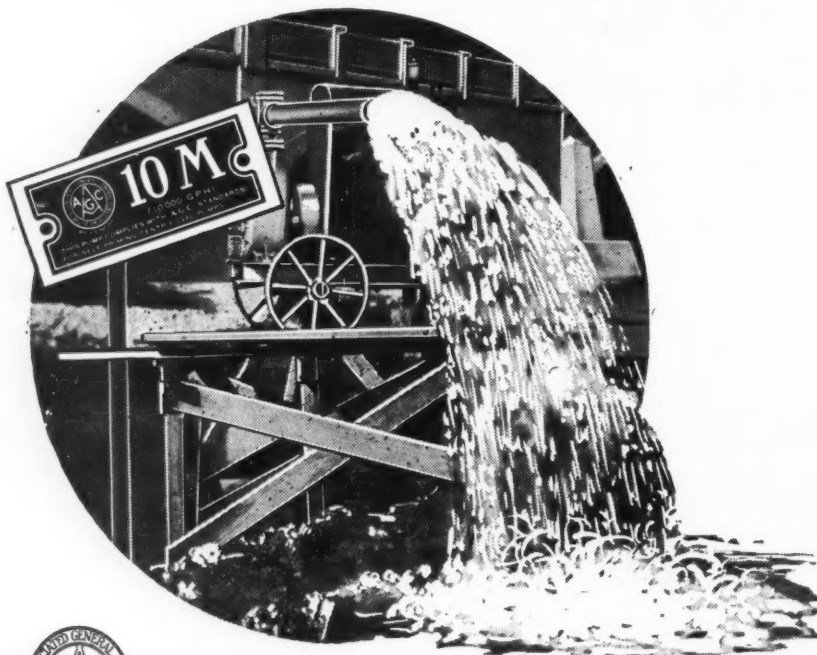
ALBION, PENNA.

EXPERIENCE
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PERFORMANCE
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WHY NOT BE SURE?



Don't gamble on pump performance. The AGC rating plate is your guarantee that the pump will deliver full rated capacity.

CONTRACTORS PUMP BUREAU

BARNES MANUFACTURING CO.

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MARLOW PUMPS

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Affiliated with

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Mansfield, Ohio

NOVO ENGINE CO.

Lansing, Mich.

Safeguards

Minimize Hazards

(Continued from page 86)

bank in a number of places, as disclosed by excavation on the job. Fall of an 8-ton chunk of rock toward the tracks in 1943 brought to a head a long-contemplated plan to make the portal cuts safe against accidents by removing or anchoring all hazardous rock.

Barricades—Protective timber barricades tied back by steel cables to anchor rods were devised and developed for this job by William H. Ryan, superintendent. Mr. Ryan's acquaintance with the two cuts goes back many years, and his presence on the job is a matter of historical interest. When the Fair Haven tunnel was constructed 52 years ago, he served as superintendent at one portal for his uncle, J. K. Ryan, New York City, contractor for the railroad. By coincidence, the division engineer in charge of the project for the railroad at that time was Clarence Blakeslee, who later resigned from his railroad position to join his brother in the firm of C. W. Blakeslee & Sons, Inc., contractor for the present job. Mr. Blakeslee now is chairman of the board.

Accompanying photographs illustrate the construction of the barricades. The contractor has on the job half a dozen heavy I-beams, 24 to 30 ft. long, which are used as bottom wales, or platform bases, for the barricades at points on the banks where beams of these lengths can be installed. Major panels of the barricades, as shown in the photographs, are built up of heavy timber wales and struts, with thick sheeting of 3- or 4-in. plank. For upper lifts and wings needed on some barricades, the contractor's forces use lighter panels sheathed with 7/8-in. lumber.

Equipment—On the day when the accompanying photographs were made, the contractor was operating on top of one of the cuts a Lima 878 1 1/4-yd.-capacity gasoline-powered crane swinging a 3/4-yd. Williams heavy-duty clamshell bucket on a 60-ft. boom. Air for paving breakers and drills used in the hard rock at this location came from an Ingersoll-Rand 105-cfm. gasoline-engine compressor. The compressor delivered to a large receiver which acted as a reservoir to permit operation of as many as three air tools at a time.

In the other cut, concrete was being placed with an Insley 1-yd. bucket handled by a Lima 1089 55-ton, 1 1/2-yd.-capacity gasoline-powered crane with an

(Continued on page 182)



LIKE A CHAMPION HITTER

FORM-SET ROPE *is Relaxed*

Nothing taut, nothing tense about the champion hitter. He's poised, confident, calm; his body's as supple as a buggy whip. That's because he's *relaxed*.

You get that same relaxed quality in Form-Set—Bethlehem's preformed rope. When wire rope has been preformed, it's free of internal tension—free of the stresses that sometimes shorten its life. It bends easily, curves easily over small sheaves and drums—and handles like a kitten.

Then, too, if a Form-Set wire should break, it doesn't pop loose from the strand. It simply lies flat. No lumping, nicking, or overlap. Nothing that will encourage breakage in other wires.

Relaxation in rope means longer life . . . higher resistance to bending fatigue . . . and championship performance. You get all three in Form-Set*—preformed rope by Bethlehem.

*Any grade and construction of Bethlehem rope can be Form-Set (preformed).

When you think WIRE ROPE



think BETHLEHEM

**ONE MAN
DOES IT**
• BETTER
• FASTER

with a *Mall*
VIBRATOR



Economize on time, labor and material . . . increase profits and job efficiency . . . by using a MALL Concrete Vibrator. Greater uniformity of strength and density is attained; voids and honeycombs eliminated; bonding strength increased. Places a stiff mix concrete faster—better—cheaper. Variable speed Gasoline Engine operates 8 other interchangeable tools.

A Type and Size for Every Job—1½ H.P. Gasoline Powered model, also available with 3 H.P. round base or wheelbarrow mounting. 1½ H.P. Universal Electric and 7500 r.p.m. Pneumatic Units.

Ask your distributor or write for literature and prices.

MALL TOOL COMPANY, 7757 South Chicago Ave., Chicago 19, Ill.



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POWER TOOLS**

Welded for Strength & Service

WELLMAN
Williams **BUCKETS**

Welded Rolled Steel
construction builds longer life
and greater utility into Wellman
buckets. Multiple Rope and
Power Arm types. Dragline.
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Buckets. ¾ to 16½ yd. capacity.

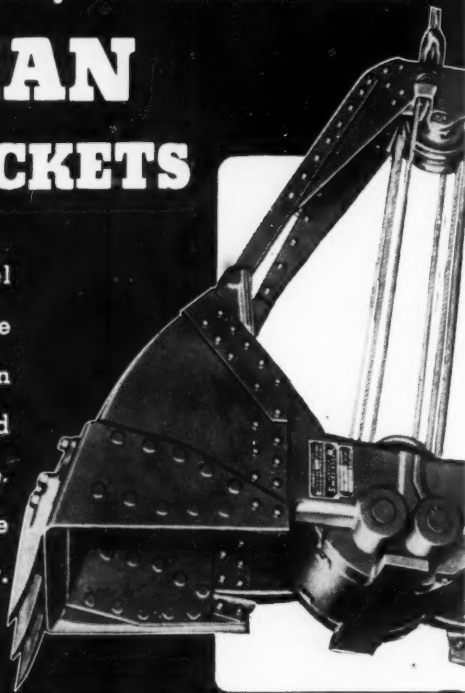
Send for Bulletin

THE WELLMAN ENGINEERING CO.

7017 Central Avenue

Cleveland 4, Ohio

Sales and Service Agencies in Principal Cities



(Continued from page 180)

80-ft. boom. The crane, traveling on a benched roadway at the top of the cut, spotted the empty bucket for filling under the discharge end of truck mixers on a roadway at a slightly higher level and swung the filled bucket out over the edge of the cut for lowering to the forms. Jaeger truck mixers delivered 3½-yd. batches of 1:2:4 concrete to the job from the contractor's own commercial plant in New Haven. The crane handled a 3½-yd. load in three trips with the concrete bucket. Air for pneumatic tools in this cut was supplied by a diesel-powered Ingersoll-Rand 315-cfm. compressor.

As indicated by accompanying photographs, the concrete facing on the rock slopes of the cut is set back at appropriate levels to provide the required thickness without wasting concrete. Prefabricated wooden panels, used for the concrete forms, are tied to the steel dowels, previously mentioned, which anchor the concrete veneer to solid rock. Adequate weep holes are provided for drainage.

It is possible that an application of Gunit or Shotcrete will be made on a portion of the exposed rock in the cut slopes as a protection against weathering.

Retaining Wall—Part of the sound rock removed from the west portal cut was utilized for construction of a stone masonry retaining wall about 400 ft. long at the toe of an earth slope. It is likely that more of the excavated rock will be used in the same way.

Progress

Because safety takes precedence over speed on a delicate job involving the safety of an operating railroad, the rate of progress of the work necessarily becomes a secondary matter, entirely dependent on the primary factor. In view of the special controls and limitations required for safe work, the contract is on a cost-plus-percentage basis. About \$200,000 has been expended since the work began on August 3, 1943. Except for concrete, work has continued through two winters, and the job now is about half completed.

Excavation along a cut bank averages about 6 cu.yd. per linear foot. The ordinary practice is to slope and bench the overburden and then to remove the unsafe rock or encase the rock face in an adequate thickness of concrete. Up to May 1, the contractor had removed 15,600 cu.yd. of excavation and had placed 825 cu.yd. of concrete. About one-third of the excavation is rock.

Supervision

For the New York, New Haven & Hartford R.R., E. E. Oviatt is chief engineer, F. J. Pitcher is engineer of bridges and structures, and Herbert E. Brink is engi-

(Continued on page 184)

...Out of the Blue!



• A design takes shape . . . the fabricated steel moves out on time . . . accurate workmanship and close adherence to "specs" the keynote . . . another satisfied customer! For accomplishing the unusual in the usual way is a matter of routine at Levinson.

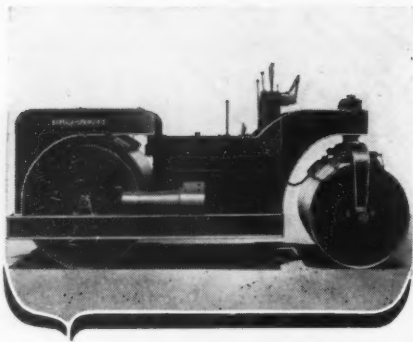


LS-1

The **LEVINSON-STEEL CO.**

33 PRIDE STREET

• PITTSBURGH, PENNA.



you always see more
**Buffalo-Springfield
Rollers**

on resurfacing jobs

THE TRANSVERSE MOUNTING of the engine and simple, bevel gear drive provide such smoothness in reversing and freedom from vibration that they are ideal for finishing bituminous surfaces. Large, wide rolls combine high compression with large capacity. Watch Buffalo-Springfield Tandem Rollers, talk to their owners and you'll see why they are preferred by the road building industry. In addition to tandem rollers from 2 to 21 tons, the line of Buffalo-Springfield rollers includes three-wheel rollers from 6 to 12 tons, 3-axle tandems from 9 to



17 tons and trench rollers for widening work.

**THE
BUFFALO-SPRINGFIELD
ROLLER COMPANY**

Springfield, Ohio

The oldest and largest builders of road rolling equipment in America

(Continued from page 182)

neer of construction. These engineers have general charge of the work, with Raymond S. Powelson as the representative of the railroad on the job.

For C. W. Blakeslee & Sons, Inc., the contractor, New Haven, Conn., Albert D. Blakeslee, secretary of the firm, exercises general supervision over the job, with William H. Ryan, superintendent, in immediate charge at the site.

★ ★ ★

Camden Causeway

(Continued from page 90)

designed for a live load of one 15-ton truck and gave excellent service under normal traffic conditions for a number of years. However, the road has been subjected to increased wheel loads and higher traffic speeds for the last few years, especially so since the beginning of the war, because of Navy bases and shipyards in the vicinity of Elizabeth City. As a result of the faster and heavier traffic, the causeway has become extremely costly to maintain. Vibration under heavy loads causes breakage of the wearing surface, floor and stringers. This damage is due not entirely to the heavy loads, but to the age of the timbers as well. The roadway has become extremely dangerous to fast moving traffic because of its narrow width and sharp curves, and because of the difficulty of keeping the surface in a reasonably smooth condition.

New Route Studied

Consideration was given to an entirely new location for the road, to avoid the deep muck crossing, but a complete relocation proved inadvisable because of the increased travel distance involved and the fact that the drawbridge over the Pasquotank River would have to be abandoned. An extensive survey of this area was made several years ago and a new location was found that would eliminate the sharp curves on the road and take advantage of the shallowest sections of swamp, without losing use of the bridge. The new location crossed the existing roadway in but one place; otherwise it was located at a sufficient distance from the present road not to interfere with traffic during construction. Sufficient fill material could be taken from the river, a reasonable pumping distance from the

(Continued on page 186)

**WHERE GOING IS
Tough
GATKE**
High-Heat-Resisting
Asbestos
BRAKE MATERIALS
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GATKE Brake Blocks and Frictions — Moulded to machined accuracy in ALL shapes and sizes — LARGE or small.

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GATKE High-Heat-Resisting Brake Materials take more punishment because they are made for tough service — using materials and processes developed thru 28 years of specialization.

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HOUR METERS**
give actual running
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Specially applicable to gas or Diesel engines, these Hour Meters register the hours of operation, just as a speedometer registers mileage. They provide valuable readings that enable owners and operators to maintain motorized construction equipment at highest efficiency. Use them on compressors, mixers, graders, tractors, bulldozers.

Compact, easily adaptable . . . send for complete details in

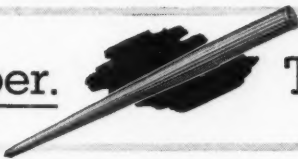
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DURANT MFG. COMPANY
1980 N. Buffum St. Milwaukee 1, Wis.

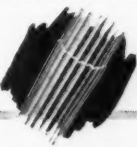
HOW TO IDENTIFY A BETTER FOUNDATION PILE

- FIRST look for a fluted  tubular design.

Fluting increases rigidity and frictional area. Tubular construction permits easy, sure inspection.

- NEXT look for the taper.  This assures full

utilization of the load carrying capacity of the soil.

- FINALLY look for extendibility.  Insures

quick extensions on job, eliminates cut-off waste.

Combine these three features....add lightness
and high structural strength....and you have

MONOTUBES



....your best assurance of dependable,
lasting piled foundations.

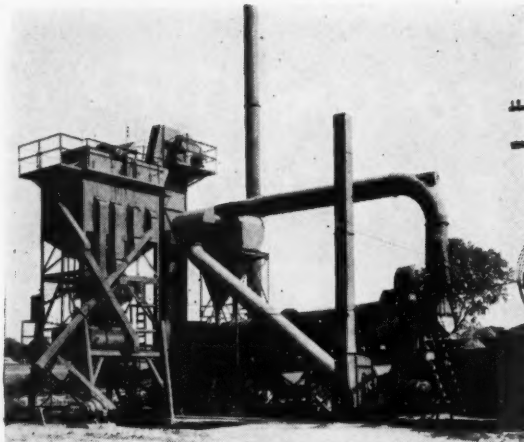
Available in gauge, size and taper to meet your requirements. Free catalog 68A gives complete data. Write The Union Metal Mfg. Co., Canton 5, Ohio.

UNION METAL

Monotube Tapered Piles



INCREASED EFFICIENCY and PRODUCTION in *Asphalt Mixing-*



☆ Compactness and a substantial increase in dryer capacity and efficiency are among the results accomplished by refinements in design in this recently completed H & B Portable (PA-30) Asphalt Plant. A larger fan is used, and the duct system from the dryer to the dust collector and from dust collector to the exhaustor has been redesigned. The new horizontal cyclone dust collector is more compact and efficient. The exhaust fan, motor which drives the dryer, and the speed reducer are combined in one completely assembled unit which is mounted on a separate platform. This decreases length of the dryer unit and greatly facilitates handling. A new type of screen reduces the overall height of the plant considerably, without reducing the bin capacity.

Further information concerning this plant will be furnished on request.

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Certain types of Owen Buckets have grit-tight bearings, special lubrication and other features to adapt them to underwater digging and assure long life under this difficult service.

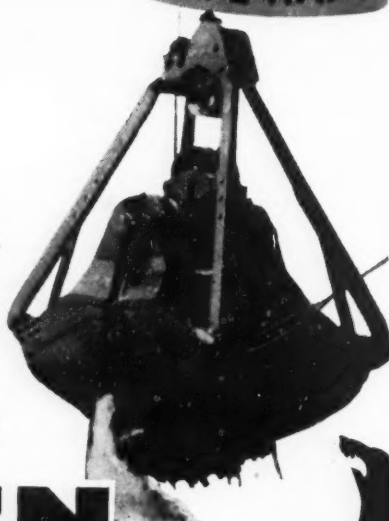
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OWEN - BUCKETS

A MOUTHFUL AT EVERY BITE

LIKE THE RUBBER

LIFE RAFT



(Continued from page 184)

new location, to make it practicable and economical to place a solid hydraulic fill across the swamp.

Dredging Operations

Plans were made in 1942 to rebuild the causeway at the new location. The plans called for removal of all muck and vegetation, as well as the many large trees that had grown over the swamp, and placing of a sand fill base for a proposed paved roadway. Because of war-time conditions it was not possible to let the contract for this work until June 1944.

Clearing of the right-of-way began in July 1944, with a dragline stripping away the muck and humus for a width equal to that of the proposed roadway. This operation was followed by dredging out all soft material down to a solid clay or sand foundation, thus creating a canal 15 to 40 ft. deep. A second dredge took fill material from the river bottom and pumped it through an extensible pipeline—as shown in accompanying illustrations—to displace the water in the canal and form a stable base for the new roadway. The project involves the removal of 591,300 cu.yd. of muck and other unsatisfactory material and the pumping in of approximately 1,000,000 cu.yd. of solid fill material.

Hurricane Hampers Operations

A tropical hurricane of unusual violence hit the area on Sept. 14, 1944, with a velocity greater than 100 mph. The high winds caused the water to recede from the river, the water level dropping about 7 ft. in a period of several hours. Resultant lowering of the water level in the canal reduced the pressure on its sides and allowed the muck to slump. This bank slumping called for a considerable amount of extra dredging by the contractor. It has progressed since without serious hindrance.

New Fill Solves 40-Year Problem

The new fill, which will provide a 40-ft. roadway, is expected to be completed some time in September of this year. It is then planned to let a contract for a 22-ft. flexible-type pavement of either sand asphalt or gravel base with asphalt top, the design providing for 9-ft. shoulders. Upon completion of this project it is believed that, with proper maintenance of the pavement itself, the resulting stable structure will have solved a problem that has been vexing engineers in the state for a long time.

Engineers from many sections of the country have watched the progress of this work with close interest, not because many roads present similar problems, but

(Continued on page 188)



**SPECIFY SCHRAMM AIR COMPRESSORS
... AS THIS CONSTRUCTION JOB DID!**

Another Compressed Air job in which Schramm Air Compressors were used!

For the many, many needs of compressed air in construction work Schramm more nearly fits the requirements of the industry because of these features: 100 per cent water cooled . . . compact and lightweight . . . mechanical intake valve...and forced feed lubrication.

Illustrated here is work being done on a Philadelphia street . . . one of many ap-

plications. Schramms are built in sizes ranging from 20 to 420 cu. ft. actual air, in every type of mounting and assembly. They are designed for heavy duty, continuous service. Because they are so rugged, so well designed, they stand the toughest treatment and steadily furnish the amount of air desired. Start planning for the New Era in Construction by using a Schramm. Write today for an up-to-the-minute booklet just published.

SCHRAMM INC. **THE COMPRESSOR PEOPLE**
WEST CHESTER
PENNSYLVANIA



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NOZZLE TESTER **Keeps Diesel Engines** **Running Efficiently**

To keep diesel engines operating at peak efficiency, this portable, precision-built Adeco Nozzle Tester is indispensable.

Light in weight yet built for heavy-duty service, it enables any mechanic to make quick accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Tests both large and small injectors, on bench or engine, at pressures up to 10,000 p.s.i. Prevents costly delays and possible damage to engine.

Ideal for testing hydraulic devices.



Write for bulletin on this practical, low-cost unit.

TESTS FUEL INJECTORS
AND HYDRAULIC DE-
VICES at Pressures up
to 10,000 p.s.i.



AIRCRAFT & DIESEL
EQUIPMENT CORP.

DEPT. 1: 4411 N. RAVENSWOOD AVE.
CHICAGO 40, ILLINOIS

(Continued from page 186)

because the project has involved some unusual engineering solutions.

Engineers in North Carolina have been particularly interested in the final disposition of one of the costliest projects in the 25-year record of highway construction in this state. The contract is being handled by the R. C. Huffman Construction Corp., Norfolk, Va., with C. W. Berger, vice-president, as resident manager. The engineering work is being handled by W. J. Overman, resident engineer for the State Highway & Public Works Commission, under the direction of J. C. Gardner, division engineer.

★ ★ ★

Oversize Plywood

(Continued from page 95)

promise to prove extremely versatile in the immediate future. Tailored for curvature in opposite directions in separate parts of the sheet, they will serve boat builders well, both as a hull planking material and for building rounded cabins. They may meet with even wider use in the building field; a single panel, for example, could be used to cover half the face of a store front, including the curved entry. The panels are ideal for building rounded bodies for trucks and trailers.

Scarf-Jointing Techniques

The principle of manufacturing long-length fir plywood panels is simple. It consists of scarf-jointing several stock plywood panels and bonding the smaller units together in a continuous sheet. However, for mass production of the giant material each of the manufacturers had to design and build special precision machinery to assure a joint of maximum strength. In addition, they had to introduce methods for handling the material in the factory and for shipping the extra-long sheets.

Matching Milled Surfaces—Crux of the manufacture is cutting the scarf or bevel at an accurate slope and with smooth surfaces so the two milled segments will match perfectly for a positive glue bond. Such tapered milled faces may be either plain, stepped or serrated according to the techniques of the manufacturer.

Using the perfected scarfing techniques, full strength of the plywood can be readily developed at the joint, when such strength is required by the ulti-

(Continued on page 190)



Try them on your *toughest problems*

FOR YEARS the Hool and Kinne Library has been providing structural engineers with the facts they need on every problem concerned with the design and construction of civil engineering structures.

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up-to-the-minute
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COVERS the how and why of foundation and substructure design and construction, the general theory of structural members, the detailed design of such members and the design of their connection with other members.

EXPLAINS the principles of statics, reactions, moments and shears in beams and trusses, influence lines, methods of computing stresses in lateral trusses and portal bracing.

GIVES details of design and construction of steel, timber and concrete structures of all types.

This is a library that must be USED to be fully appreciated—that is why we want YOU to use it. We want you to forget the financial side of this proposition until you have solved some knotty problem that you may be up against—to find out how a specialist in that particular field would handle it. We want to prove to you that this Library furnishes you with what amounts to the consulting services of 54 recognized structural engineering specialists.

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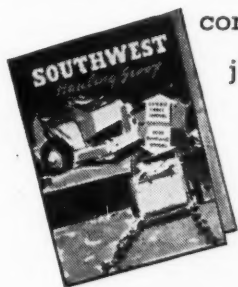


SOUTHWEST *Hauling Scoop*

SINGLE CABLE CONTROL

Here it is—the first rear dump hauling scoop with *single cable control*! No longer is it necessary to have hydraulic equipment to have a rear dump unit. Southwest does it with the single cable control. And here are some of the advantages: Dumps safely over embankments—Works well in difficult places—Dumps while moving forward, backward or standing still—Shortens operational cycles by *controlled* spreading. Sturdy design and

construction to handle tough jobs easily. Ideal for road maintenance and repair.



Four page bulletin available on request. Gives engineering data on the three standard sizes of Southwest Hauling Scoops. Write Department A130 Southwest Welding & Manufacturing Company, Alhambra, California.

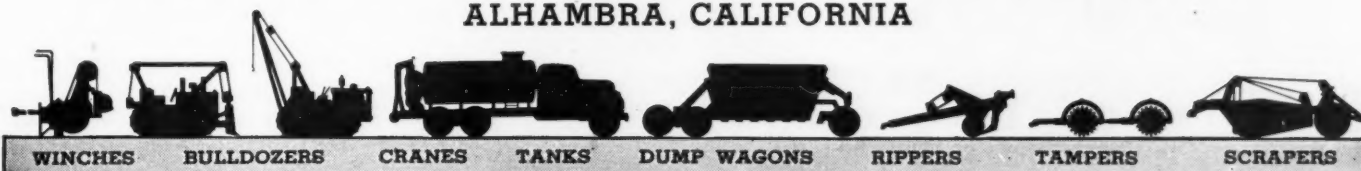


The Southwest Single Cable Control Scoop can be operated by a single drum or as a "dozer scoop" combination with double drum unit.

CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Co.

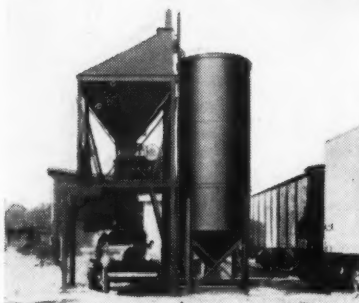
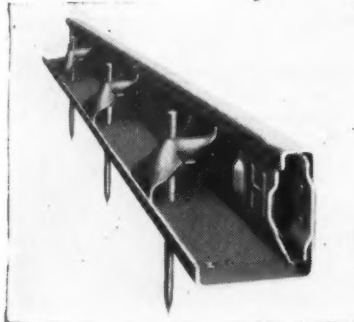
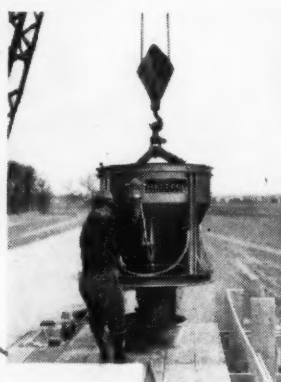
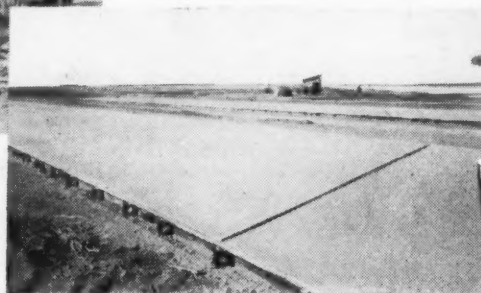
ALHAMBRA, CALIFORNIA





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- T-29-CB (General Duty Concrete Buckets)
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● Prepare for the "go-ahead" signal on concrete construction by writing or calling Heltzel now. Ask for these engineering-styled, easy-to-read, easy-to-use, Heltzel bulletins:

- T-29-CB (General Duty Concrete Buckets)
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HELTZEL STEEL FORM & IRON CO.
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BUILDS IT BETTER

- BINS, Portable and Stationary
- CEMENT BINS, Portable and Stationary
- CENTRAL MIXING PLANTS
- BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
- BITUMINOUS PAVING FORMS
- ROAD FORMS (with lip curb and integral curb attachments)
- CURB FORMS
- CURB AND GUTTER FORMS
- SIWALK FORMS
- SEWER AND TUNNEL FORMS
- CONCRETE BUCKETS
- SUBGRADE TESTERS
- SUBGRADE PLANERS
- TOOL BOXES
- FINISHING TOOLS FOR CONCRETE ROADS

(Continued from page 188)

mate use of the material. Phenolic resin adhesives are used to bond the segments together, making the scarf joint as permanent and completely waterproof as the phenolic-adhesive-bonded exterior-type fir plywood. The adhesives at the scarf are set under both heat and pressure in specially constructed presses at the various factories. Sanding, as the final operation in joining the units into a long panel, removes the mark of the joint and leaves a line difficult to distinguish without close inspection.

Advantages of Long Panels

These are the advantages of giant plywood stressed by the manufacturers and supported by the findings of firms using the material: speed of construction; added strength (through plate action of the continuous sheet) with reduction in weight and fewer or lighter framing members and fastenings; elimination of joints; and appearance value.

War experience has firmly established long-length plywood as a basic material for the boat builder, particularly when he is producing any one design in large quantity. In this connection it is interesting to note that many boat yards are prepared to build and market stock models in both pleasure and work craft after the war; long panels can serve well under such a plan.

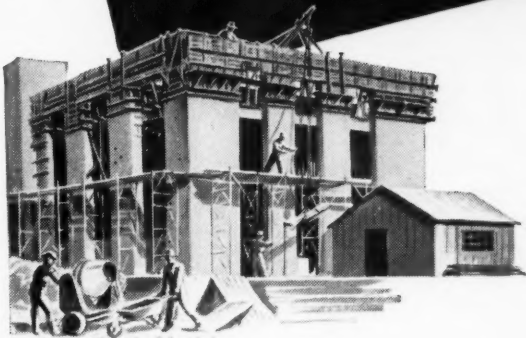
Based on performance of panels in the dome-shaped barracks previously mentioned, such cylindrical structures as grain bins, silos, tanks and tank forms may be made from oversize plywood in the immediate post-war period. The material may contribute toward simplified construction of houses and small buildings, particularly prefabricated structures.

Webs for Beams

Already tested by engineers of Douglas Fir Plywood Assn. at Tacoma, Wash., working jointly with Prof. Bror L. Grondal at the University of Washington testing laboratories, are full-size box beams and I-beams built with webs of scarf-jointed plywood. The results are informative. As an example, a plywood I-beam designed for a load of 9,240 lb. carried an ultimate load of 41,200 lb. The 24-ft.-span beam had a web of 1 3/16 in. plywood 24 in. deep and lumber flanges 2 5/8 x 3 5/8 in. Failure under test came in the lumber flanges, not in the scarf-jointed plywood. Structural advantages of continuous plywood webs glued to framing members, as revealed by this test, may lead to use of such panels for loading ramps, hangar doors and special containers.

Of particular interest is the recent use
(Continued on page 192)

RECONVERSION Calls for SPEED



And more speed means more profit for builder and owner alike. Whether your reconversion plans call for a new building or an addition . . . alterations or repairs . . . big job or small, use Lehigh Early Strength Cement.

BUILDINGS AND FACTORIES

\$1200 was saved and 66 days gained on a new building by the use of Lehigh Early Strength Cement . . . and the tenant paid a bonus for earlier occupancy. On a factory job, the forms were stripped from the face of the building in 5 days instead of 21 days.

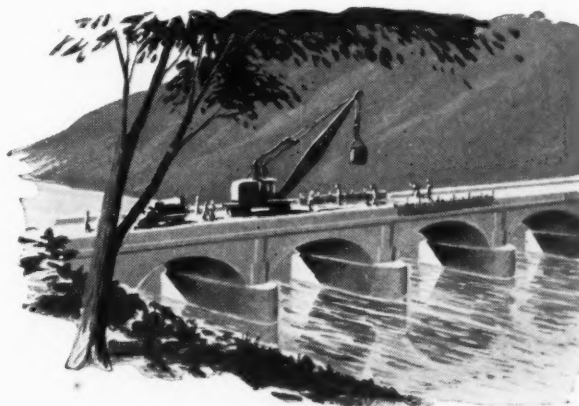
REPAIRS AND ALTERATIONS

20 hours after pouring the concrete, 1,500-lb. iron wheels were rolled over the new floor in a manufacturing plant. And in another factory, 23 tons of machinery were placed on a concrete base only 24 hours old. In both cases Lehigh Early Strength Cement was used.

There are many places on highways and bridges and on other jobs, too, where its use will save money and time.

HIGHWAYS AND BRIDGES

A \$500 per day penalty was avoided in the construction of a tunnel for a highway by using Lehigh Early Strength Cement. On a bridge job, this time-saving cement made possible the driving of concrete piles in 7 days instead of a month.



SIDEWALKS AND STREETS

Less than 12 hours from the time Lehigh Early Strength Cement was poured on a busy sidewalk, pedestrians were using it. And in another city, this time-saving cement made street intersections ready for traffic in 24 hours.

This fast-curing, quick-service cement means profit anyway you look at it.

Our Service Department will gladly work with you in planning the most economical way to use Lehigh Early Strength Cement.



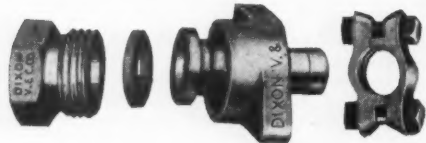
LEHIGH EARLY STRENGTH CEMENT
LEHIGH AIR ENTRAINING CEMENT
LEHIGH MORTAR CEMENT
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Lehigh
CEMENT

LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.

Designed to Speed-Up Drilling Operations, Above Ground or Below

The two couplings described below are known to provide maximum convenience efficiency and safety in mining, tunneling, construction, road-building and other pneumatic hose service. Both have refinements exclusive with DIXON . . . features that assure long, low-cost service under all conditions.



"DIXON" AIR HAMMER COUPLING

A washer type coupling, for all rock drill service and many other pneumatic tool applications. Plain design and construction, yet strong, durable and efficient. Corrugated stem, while easily inserted, is practically blow-off proof. Reinforced bolt lugs on clamp will not bend out of shape.

Compact Type, Style WLD-7, $\frac{1}{2}$ " and $\frac{3}{4}$ ".
Heavy Type, Style WHD-9, $\frac{3}{4}$ " and 1".



"AIR KING" Quick-Acting, Universal Type AIR HOSE COUPLING

With Auxiliary Locking Arrangement

For all types of pneumatic tools. Locking heads are identical for all sizes of hose and threaded pipe ends, permitting coupling of any two sizes of hose, or hose to pipe, within the "Air King" size range, without adapters, bushings or extra fittings. Shanks of hose ends are long, amply corrugated and smoothly finished, permitting easy insertion in hose and assuring a tight grip under clamp pressure.

A special locking arrangement, for services of a hazardous nature or those involving excessive vibration, makes it impossible for coupling to come apart until manually released.

Sizes: Hose Ends— $\frac{3}{8}$ " to 1"; Pipe Ends— $\frac{1}{4}$ " to 1".

Sold by Manufacturers and Jobbers of
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BUY MORE WAR BONDS . . . AND
KEEP THEM!

DIXON
VALVE & COUPLING CO.
Main Office and Factory: PHILADELPHIA, PA.
BRANCHES: CHICAGO, BIRMINGHAM, LOS ANGELES, HOUSTON

(Continued from page 188)

of extra long, 9-ft.-wide panels by the Illinois Central R. R. as siding for refrigerator cars built by converting old box cars. On this job the builders learned that, for efficient utilization of mammoth panels, adequate equipment for handling the material is needed, and each job should consist of a sizable number of like units. Smaller scarf-jointed plywood—up to 20 or 25 ft. long and perhaps 4 or 5 ft. wide—prove practicable when a relatively few units are to be built and when facilities for handling the panels are limited.

Thick Plates Important

Use of plywood gusset plates, which has increased steadily since timber connectors were introduced in the United States 10 years ago, has expanded abruptly during the war with the mass erection of timber-framed heavy structures. Following pre-war practice, the extra heavy plywood plates, up to 3 or 4 in. thick, have been used primarily in roof truss construction with ring connectors. The success of such applications has led to the use of plywood gussets and knee-braces for less important structures in which bolts or nails serve to transfer stresses. In bridge and tower construction, too, gusset of exterior-type plywood have proved efficient. Further, during the war, use of thick plywood gussets as connecting members for strengthening plates has spread to the marine field with naval architects specifying them for many parts of boats, barges and landing craft.

Military needs have fostered other applications of thick panels. Typical is the use of $2\frac{1}{4}$ -in.-thick exterior plywood for the ends of stringers for ponton bridge treadways. Here plywood is required to provide a split-proof stringer which can be tied to adjacent treadway stringers with bolts. By using plywood ends, a strong, split-proof member results so that the quality of lumber in the balance of the treadway may be reduced and still carry the desired load.

While exterior-type fir plywood always has been specified for gussets that are to be exposed to the weather or used in marine constructions, architects and engineers today favor gussets of outdoor-type plywood whether they are to be used inside or out. Such panels are manufactured with completely waterproof phenolic resin adhesives set under what is known as "conditioned gluing" or bonded by the recently-developed thermal process utilizing high frequency electricity to set the adhesives. Thick plates are made on special order as to thickness and construction so as to meet exactly the design requirements of the gussets.

Worthington-Ransome Blue Brute Distributors

By referring to the advertisement on 4th Cover, you'll learn the meaning of the (1), (2) or (1-2) beside their names.

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Los Angeles (2) Smith Booth Usher Co.
San Francisco (2) Coast Equipment Co.
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Denver (1-2) Power Equipment Co.
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Fla., Jacksonville (1) Julien P. Benjamin, Inc.
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Ga., Atlanta (2) Tractor & Machinery Co.
Savannah (1) Morgans, Inc.
Ida., Boise (1-2) Olson Manufacturing Co.
Ill., Chicago (1-2) Chicago Construction Equipment Co.
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Chicago (1) Thomas Hoist Co.
Ind., Fort Wayne (1) American Steel Supply Co.
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Iowa, Des Moines (2) Electric Eng. & Const. Co.
Ky., Harlan (2) Hall Equipment Sales Co.
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Louisville (2) Williams Tractor Co.
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Minn., Minneapolis (1-2) Philippi-Murphy Equip. Co.
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Miss., Jackson (1) Jackson Road Equipment Co.
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Albuquerque (1) Morrow & Co.
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New York (2) Air Compressor Rental & Sales
New York (1-2) Hodge & Hammond, Inc.
New York (1-2) Railroad Materials Corporation
Olean (2) Freeborn Equipment Co.
N. C., Raleigh (2) Carolina Tractor & Equipment Co.
N. D., Fargo (1-2) Smith Commercial Body Works, Inc.
O., Cincinnati (2) Finn Equipment Co.
Cleveland (2) S. M. Clancey
Cleveland (1) H. B. Fuller Equipment Co.
Cleveland (2) Gibson-Stewart Co.
Marietta (2) Northwest Supply & Equipment Co.
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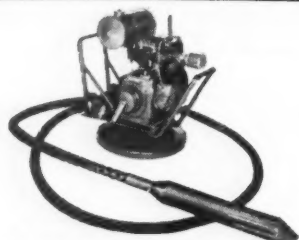
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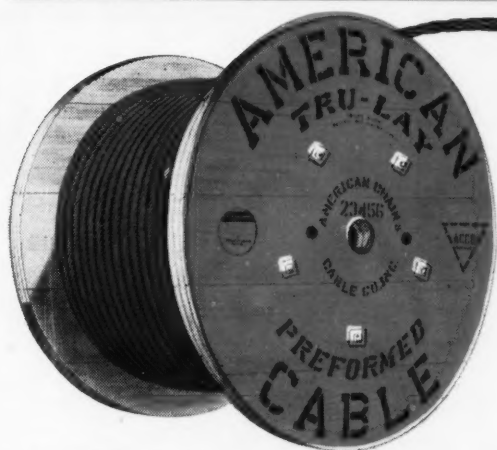
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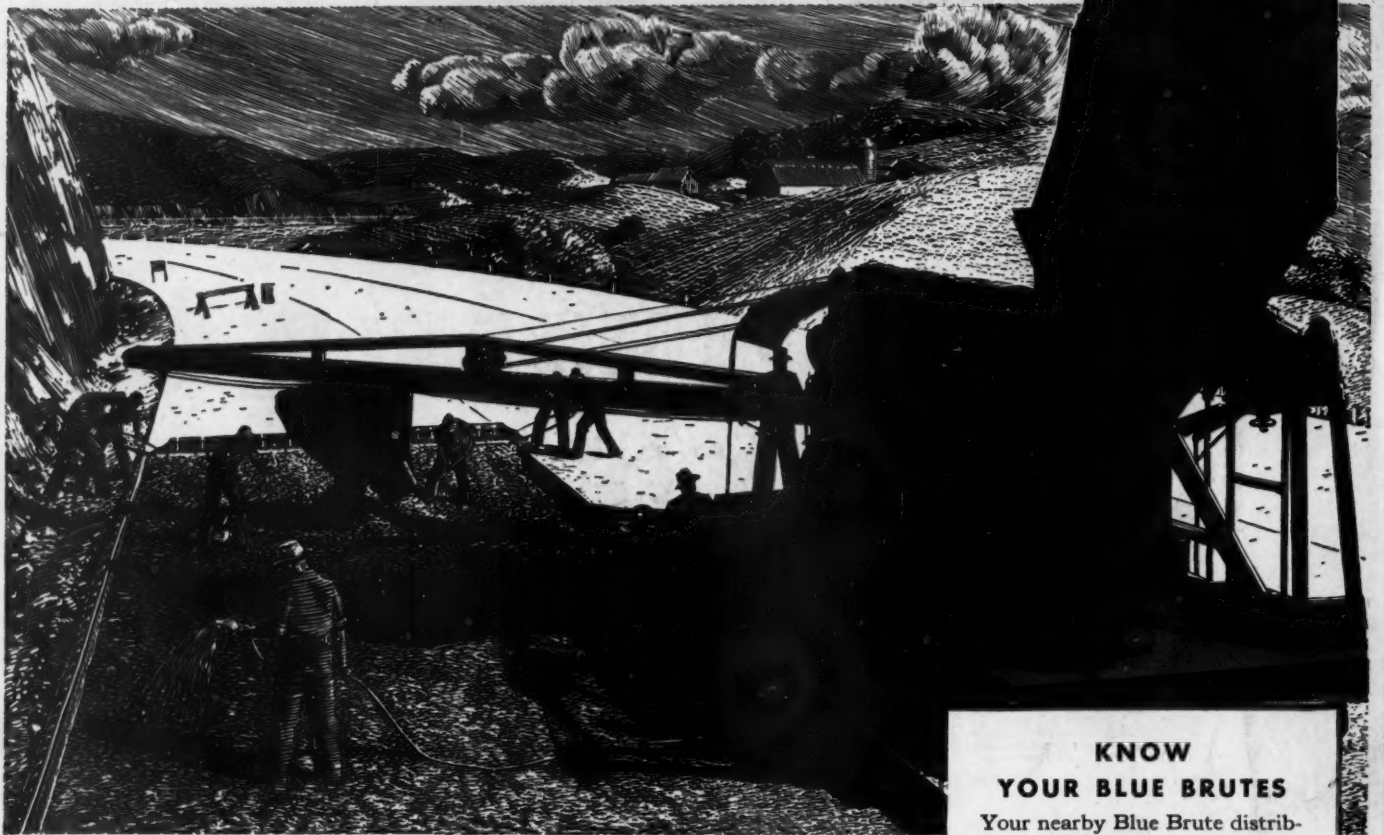


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1

Blue Brutes include: Pavers, Concrete Spreaders**, Concrete Mixers, Concrete Placing Equipment, Big Mixers, Finishing Machines**, Pneumatic Placing and Grouting Equipment, Truck Mixers, Plaster and Bituminous Mixers, and Accessories.

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